IN THE UNITED STATES DISTRICT
COURT FOR THE NORTHERN DISTRICT
OF OKLAHOMA

1. JAGAN MAHADEVAN,	§	
	§	
Plaintiff,	§	
	§	
vs.	§	CIVIL ACTION NO. To be Determined
	§	JURY TRIAL DEMANDED
	§	
1. MOHAN KELKAR,	§	
as an official of the	§	
University of Tulsa, and	§	
	§	
2. WINONA TANAKA,	§	
as an official of the	§	
University of Tulsa, and	§	
	§	
3. University of Tulsa, and	§	
	§	
1 to 30 Does,	§	
	§	
Defendants.	§	

COMPLAINT

I. INTRODUCTION

1. Defendants Mohan Kelkar and Winona Tanaka abetted and contributed to the knowing and willful violation of Plaintiff's copyright rights by approving the publication of two scientific articles that were original creations of Plaintiff, without his permission and over his objections.

2. Defendants knew of the infringement, had authority and duty to prevent the infringement, were aware of Plaintiff's objections, were aware of Plaintiff's rights and were educated in law. Yet, Defendants unilaterally, arbitrarily and unreasonably overruled Plaintiff's objections and allowed the violation of his rights.

3. Further, Defendant Winona Tanaka issued a memorandum stating that the matter of plagiarism in the infringing articles were investigated, under the University of Tulsa's (TU's) ethical conduct policy, when there was not even a committee of inquiry formed under the ethical conduct policy.

4. Defendant Winona Tanaka's conclusions in the memorandum also directly violated Plaintiff's copyright rights by permitting illegal transfer of Plaintiff's copyright. Defendant Tanaka's decisions directly violated 17 U.S.C. § 204(a) and 17 U.S.C. § 201(e).

5. Furthermore, in order to deflect their liability for violation of Plaintiff's copyright rights Defendant Mohan Kelkar and Defendant Winona Tanaka framed Plaintiff, under their harassment policy, and participated in coordinated misrepresentation of facts of Plaintiff's copyright rights to a state court in retaliation for Plaintiff's effort to protect his rights under the copyright laws.

II. BACKGROUND

6. Plaintiff graduated with high academic accomplishments and unblemished record from Texas and joined as an Assistant Professor of Petroleum Engineering at University of Tulsa (TU) in Oklahoma in 2006.

7. Plaintiff served as undergraduate adviser between 2006 and 2009 and was promoted as graduate adviser from 2009 to 2011 at TU. As graduate advisor it was Plaintiff's responsibility to manage the academic admissions of new graduate students as well as manage academic policies for existing graduate students. In addition, Plaintiff conducted scientific research and taught various subjects.

8. Starting in spring 2007, Plaintiff created an original research program at TU on basic sciences in application to geologic carbon dioxide sequestration which is a method to

potentially mitigate climate change. Prior to Plaintiff's creative effort there was no such research program at TU. Plaintiff spent a lot of effort, hard work, and personal sacrifice in designing and building research program and the equipment for the measurements.

9. As part of a graduate research supervision Plaintiff directed and conducted measurements on the facility, called as an IFT visual cell, which Plaintiff earlier designed and purchased. The experiments consisted of study of physical interactions between liquefied carbon dioxide, water and certain mineral samples at various pressures and temperatures. The measured physical parameters in these interactions are called contact angles and interfacial tensions respectively. The acronym IFT in the name of the equipment refers to interfacial tension.

10. The direct infringer of Plaintiff's copyright, a research student named Prem Bikkina, published Plaintiff's works without consent and over Plaintiff's objections. A copyright infringement complaint is pending before this Court (See 4:30-CV-0536 filed on July 21, 2020 and transferred to this district on October 15, 2020).

11. In the course of the research program and supervision there were numerous written material and ideas that were shared by Plaintiff with the infringer which Plaintiff intended to publish.

12. Plaintiff played an active part in selection of literature, identification of models for phase behavior calculations, development of algorithms to compute phase behavior from those models, conversion of those algorithms to develop a computer calculation program, and conducting the laboratory work.

13. Plaintiff registered copyright on the contents to his original work of authorship from his supervision and articles that Plaintiff authored whose certificate numbers are 1) TXu

2-148-355 effective date May 21, 2019 and 2) TXu 2-156-594 effective July 30, 2019. These certificates are attached as **Exhibit A** and **Exhibit B** respectively. These are called the Copyrighted Works. These works have not been published by Plaintiff.

14. Around April 15, 2010 the infringer, Prem Bikkina, encountered serious contamination of the quartz samples that were being used in the experimentation.

15. When asked to repeat the experiments, the infringer quit working in Plaintiff's research group, soon after contamination was discovered on April 21, 2010. Dr. Winton Cornell, a senior professor and fellow faculty collaborator at TU, was a key witness to this contamination.

16. At the time of leaving Plaintiff's lab, around April 30, 2010, however, the infringer insisted to Defendant Mohan Kelkar on conducting "additional" tests on the contaminated samples and publish them.

17. Defendant Mohan Kelkar interfered and decided, citing to his authority as a chairman of the department, to let the infringer to publish such work after collection of additional data on the contaminated samples regardless of Plaintiff's opinion or consent.

18. In response to Defendant Mohan Kelkar's unilateral decision to allow the publication, Plaintiff stated that he could not participate in such publication as the samples were contaminated. However, Plaintiff never agreed to let his already written Copyrighted Works be published.

19. The unilateral decision by Defendant Mohan Kelkar eventually resulted in violation of Plaintiff's copyright rights and serious scientific research misconduct under TU's ethical conduct policy.

20. Defendant Mohan Kelkar then stripped Plaintiff of the access to the

instrumentation to let the infringer collect further data on the contaminated samples. In doing so Defendant Mohan Kelkar denied Plaintiff the ability to remediate the contamination issue leading to the mutilation of Plaintiff's research program and work.

21. Then, sometime around May 12th, 2010 Defendant Mohan Kelkar gave directions to the infringer to submit Plaintiff's work for publication but specifically directed the infringer not to inform Plaintiff before the submission. The infringer who infringed on Plaintiff's rights confirmed that he acted under the directions of Defendant Mohan Kelkar.

22. The infringer, with the active support from Defendant Mohan Kelkar, then took the contents of the original article, the Copyrighted Works, and split it into two separate parts.

23. To one part, the infringer added the contaminated sample datasets that he collected after quitting Plaintiff's lab, but did not admit the contamination, and submitted it for publication around March 2011 without informing Plaintiff. This publication became Infringing Work #1.[1]

24. Infringing Work #1, consisted of Plaintiff's original creations that included the written methods, procedures, pictorial representation of the equipment facility, and literature study that Plaintiff selected for the study.

25. Defendant Mohan Kelkar's decision was not merely exercise of administrative authority but an active abetment of the violation of Plaintiff's copyright rights and subversion of Plaintiff's rights under 17 U.S.C. 101 *et seq*.

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[1] Exact citation of the first paper, Infringing Work #1, is Bikkina, P.K., 2011. *Contact angle measurements of CO_2–water–quartz/calcite systems in the perspective of carbon sequestration*, International Journal of Greenhouse Gas Control, 5, 1259–1271. This paper and dates of publication can be accessed online from http://www.sciencedirect.com/science/article/pii/S1750583611001241

26. Plaintiff's rights vested as soon as Copyrighted Works were created and Plaintiff never transferred his copyright rights as required under 17 U.S.C. 204(a) for any such claim of transfer to be valid.

27. Further Defendant Mohan Kelkar's actions directing the infringer to publish Infringing Works without notice of the contents, and without Plaintiff's written consent, rendered such transfer invalid under 17 U.S.C. 201(a) and (e).

28. Defendant Mohan Kelkar was informed of Plaintiff's objections to publication of contaminated data on April 30, 2011 and later many times over.

29. Defendant Kelkar undertook secretive communications, with a professor from University of Texas who is also known to Plaintiff, to verify the contents of Infringing Work #1. But Defendant Kelkar neither informed Plaintiff of the contents of Infringing Work #1 nor acknowledged to the professor from Texas about the origins of the research work which was actually Plaintiff's original work.

30. Defendant Mohan Kelkar was well aware of Plaintiff's objections about publishing contaminated data as was revealed from the tests in Dr. Winton Cornell's lab. Yet, he chose not to consult with either Dr. Cornell or the Plaintiff before issuing directions to the infringer to publish Infringing Works.

31. Defendant Mohan Kelkar's abetment of copyright infringement further resulted in falsification and fabrication of data as the infringer suppressed and denied contamination on the samples.

32. When Plaintiff learned of Infringing Work #1, which was published without admitting contamination, he reported it to an administrator at TU wherein a discussion ensued with the infringer mediated by the TU administrator.

33. In order to introduce transparency to the research record, as part of a negotiation started by the TU administrator on May 20, 2011, Plaintiff authored a paragraph summarizing the laboratory data from Dr. Winton Cornell's lab showing the contamination and added this to the draft of Infringing Work #1.

34. However, the infringer entered into the negotiation in bad faith and to deceive and defraud Plaintiff: (1) upon the encouragement of Defendant Mohan Kelkar, the infringer had already taken the second part of the split article and submitted that as Infringing Work #2 by transferring copyright to the journal around March 2011, for eventual publication, but never revealed that during the discussions; (2) then the infringer started rebutting Plaintiff's added paragraph in Infringing Work #1 by adding counter-paragraphs denying the contamination and making observations that didn't exist in the laboratory that was misleading to the reader of that article into believing that there was no contamination. These contributed to falsification and fabrication of data by the infringer leading to the mutilation of Plaintiff's written research work product.[2]

35. The TU administrator voluntarily canceled the discussions on May 21, 2011 at 8:46 PM and issued a warning that unless an agreement was obtained, which later turned out to be an expanded scope, the communications from the discussion cannot be used for later claims. See **Exhibit C** for a true and correct copy of the email sent by the TU administrator, which included Defendant Winona Tanaka, canceling the discussions along with a caution to not use

[2] At least half-a-dozen peer articles are still not able to reproduce the data in the article clearly pointing to research misconduct by the infringer. Dr. Winton Cornell and other independent scientists confirm that the "additional" data that infringer added, and allowed to be published by Defendant Mohan Kelkar, together with the infringing content, was indeed contaminated.

the communications in making any claims without a final agreement.

36. At this time, Defendant Winona Tanaka, despite not having any expertise in the subject matter, got involved as the ultimate deciding authority on the publication of Infringing Work #1.

37. Sensing deception, apparent from the expanded scope of discussions and the added distortions in Infringing Work #1, Plaintiff disagreed to any publication on June 3, 2011 and explicitly reserved claims for authorship of his literary works. See **Exhibit D** for a true and correct copy of the email written by Plaintiff to Defendant Tanaka disagreeing with the publication.

38. Despite Plaintiff's disagreement, Defendant Winona Tanaka, based on Defendant Mohan Kelkar's exhortations, directly resubmitted Infringing Work #1 to the journal after it was taken down.

39. Defendant Tanaka, in a communication around 11 AM on June 6, 2011, deliberately chose not to inform Plaintiff of either Infringing Work #1's contents or the decision to send Infringing Work #1 for publication.

40. Defendant Tanaka was aware of the illegality of the decision but knowingly override Plaintiff's federal law copyright rights.

41. Then, Defendant Tanaka wrote a letter to the editor, again without informing Plaintiff, and made claims that the university decided to publish the article over Plaintiff's objections. See **Exhibit E** for a true and correct copy of the letter written by Defendant Tanaka to the editor of the journal for Infringing Work #1.

42. In the letter, Defendant Tanaka stated that Plaintiff objected to the publication, and hence knew of Plaintiff's objections. Defendant Tanaka's unilateral decision to overrule

Plaintiff's objections to the publication of Infringing Work #1 and transfer copyright for Infringing Work #1 to the journal against his wishes was a direct violation of 17 U.S.C. 201(e).

43. Plaintiff reiterated his objection to the publication by filing a complaint to TU under the ethical conduct policy on July 22, 2011 but it was never investigated under that policy.

44. Shortly thereafter, on September 21, 2011, even after learning of Plaintiff's objection to the first publication, the infringer published the previously concealed Infringing Work #2 without informing or otherwise even showing the contents of the second publication.[3]

45. This time, the infringer took the remaining contents of the Copyrighted Works and an "abstract" which had earlier been authored by Plaintiff, rearranged the sentence ordering and called it as the abstract for the Infringing Work #2. Then he removed Plaintiff's name.

46. Further, the infringer attributed Infringing Work #2 exclusively to himself and two other persons who had no original contribution. One of the authors was the infringer's former advisor outside United States and had no original creation in that article or even contact with Plaintiff.

47. The second additional author was a faculty at TU who admitted on record that he had no contribution to the article except to look at it and that he has never worked on such subjects before.

48. When, around November 14, 2011, Plaintiff accidentally discovered the

[3] The second paper, Infringing Work #2, was published online on September 21, 2011 after Plaintiff objected to publication, in June 03, 2011 by refusing to sign any agreement to transfer rights to publish his original work of authorship, ideas, methods and processes. See Bikkina, P.K., Shoham, O. and Uppaluri, R., 2011, *Equilibrated Interfacial Tension Data of the CO2-Water System at High Pressures and Moderate Temperatures*, Journal of Chemical and Engineering Data, 56 (10), 3725–3733. This paper and dates of publication can be accessed online from http://pubs.acs.org/doi/abs/10.1021/je200302h.

Infringing Work #2 on internet, Plaintiff filed a second administrative complaint to Defendant Winona Tanaka alleging plagiarism in the Infringing Works.

49. In response, Defendant Tanaka again made a unilateral and arbitrary decision to overrule Plaintiff's valid objections to violation of his copyright rights. Instead of investigating the issue under the university's ethical conduct policy, Defendant Tanaka wrote a letter, on November 15, 2011, to the infringer's former advisor in India and fraudulently stated that Plaintiff "gave up" his copyright rights and that he is not entitled to any copyright. See **Exhibit F** for a true and correct copy of the letter written by Defendant Tanaka.

50. Defendant Tanaka's statement in the letter was knowingly untrue because the TU administrator issued the email of May 21, 2011 canceling the discussions and Defendant Tanaka was aware of that.

51. Further, Infringing Work #2 had been concealed by the infringer from Plaintiff. On belief, knowledge and available evidence, Plaintiff believes that Defendant Tanaka also knew of the existence of Infringing Work #2 but chose to conceal that fact also to enable the copyright infringement and avoid liability for it.

52. The infringer's former advisor from India, who was a complete stranger to Plaintiff's original research program at TU, had nothing to do with Plaintiff's research at Tulsa. Defendant Tanaka, without an iota of sense of ethical conduct herself, permitted the former advisor in distant India to usurp and reap unjust enrichment of Plaintiff's work done at Tulsa by adding himself as a coauthor in Infringing Work #2.

53. On December 16, 2011 at around 4:53 PM, owing to the seriousness of the alleged research misconduct in Infringing Works, Defendant Winona Tanaka reluctantly agreed to send Plaintiff's complaint to inquiry and agreed to form an inquiry committee under the "ethical

conduct policy" which was styled after the federal research misconduct policy. See **Exhibit G** for a true and correct copy of the email written by Defendant Tanaka informing Plaintiff of her decision to form an inquiry committee in the second page.

54. But sometime later in 2012, Defendant Winona Tanaka again unilaterally abandoned the process of inquiry and investigation but never informed Plaintiff about it.

55. When, on April 19, 2013, Plaintiff requested to know the status of the investigation and alerted that the plagiarism issue was an instance of copyright infringement, the Defendant Winona Tanaka hurriedly issued a "final memorandum" and closed Plaintiff's complaint, on May 28, 2013.

56. In the "final memorandum" Defendant Tanaka stated that the alleged research misconduct issues were investigated under their ethical conduct policy and that there was no plagiarism or unethical conduct by the infringer.

57. But, no inquiry committee or investigatory committee was ever formed under the ethical conduct policy. After a decision for inquiry is made, only a committee of subject matter experts could make further decisions under that policy.

58. Plaintiff's administrative complaint was improperly closed leaving Plaintiff with no option but to approach a federal court to redress the infringement caused by the infringer.

59. On August 26, 2013, Plaintiff advised the infringer to retract the two articles, by sending a cease and desist letter, and reserved claims of copyright infringement, violation of moral right and misappropriation of intellectual property rights. In response, the infringer filed a pre-emptive strike by filing a suit in a state court.

60. Defendant Kelkar, Defendant Tanaka and two other senior officials from TU thereafter formed a gang of witnesses and together wrongly stated to the state court that Plaintiff

gave up his copyright rights and that Plaintiff's complaint of plagiarism to TU were investigated under TU's ethical conduct policy.

61. A former federal scientific fraud investigator reviewed the numerous emails and documents which were discovered only in year 2018, including recorded statements, concluded that there was never any investigation by TU under the ethical conduct policy and that there could have been findings against the infringer if indeed an inquiry or investigation were completed. See **Exhibit H** for a true and correct copy of the declaration submitted to this Court by Dr. Alan Price in a separate action, under case no. 4:20-CV-00536-GKF-JFJ on copyright infringement pending adjudication by this Court.

62. That there was a collective effort by the defendants, to perpetuate the falsity that Plaintiff gave up his copyright rights and that there was an investigation of the research misconduct under the university's ethical conduct policy, was evident from the fact that the defendants were collective in their deliberate omission of their own directive issued by email on May 21, 2011 that there cannot be any publication of the copyrighted works without an agreement.

63. Plaintiff never gave any permission to publish content in the already authored Copyrighted Works or otherwise infringe on Plaintiff's rights.

64. Defendants' untrue statements, that Plaintiff gave up his copyright right, culminated in the denial of Plaintiff's federal rights and adverse judgment against Plaintiff on plagiarism.

III. JURISDICTION AND VENUE

65. This Court has original jurisdiction over this matter pursuant to 28 U.S.C. § 1400, which grants original jurisdiction over suits authorized by 17 U.S. C. § 101 et seq over residents

in Tulsa, Oklahoma.

66. Original jurisdiction is also proper under 28 U.S.C. § 1332 (diversity jurisdiction) as multiple states are involved and the amount in controversy exceeds the minimum amount required to satisfy jurisdiction.

67. This Court further has original jurisdiction over all causes of action in this matter, pursuant to 28 U.S.C. § 1331, which gives district courts original jurisdiction over all civil actions arising under the Constitution, laws, or treaties of the United States.

68. Venue is proper under 28 U.S.C. § 1391(b) as Defendants are residents of this district in Oklahoma. TU conducts operations in this district in Oklahoma.

69. This Court has jurisdiction for creating declaratory remedy and granting injunctive relief under 28 U.S. Code § 2201 and 28 U.S. Code § 2202 respectively. The declaratory remedy is authorized by Federal Rules of Civil Procedure 57 and injunctive relief by Federal Rules of Civil Procedure 65.

IV. PARTIES

70. Plaintiff is a natural person who is a resident of Houston, Texas.

71. Defendant Tulsa University is a large private university that seeks federal research funds for various scientific research activities. Tulsa University is required by federal research misconduct regulations of all federal granting agencies to maintain the federal research misconduct policy and enforce the policy to all its employees to be eligible for federal funds. Tulsa University is also referred to as TU in this complaint.

72. Defendant Mohan Kelkar is a natural person known to be a resident of Tulsa. Defendant Mohan Kelkar was a chairman of the department of petroleum engineering at TU during the material times of this complaint. Defendant Mohan Kelkar also has a law degree.

73. Defendant Winona Tanaka is a natural person known to be a resident of Tulsa. Defendant Winona Tanaka was Vice-Provost of University of Tulsa and represented the official position of University of Tulsa during the material times of this complaint. Defendant Winona Tanaka is a primarily a lawyer and holds a law degree.

74. The infringer of Plaintiff's copyright rights, Prem Bikkina, is referred to herein as "infringer" in this complaint. Details of the infringer's actions and claims for direct copyright infringement are described in the complaint 4:20-CV-00536-GKF-JKF.

V. LEGAL FRAMEWORK

75. 17 U.S.C. § 101 *et seq*. contains the statutes establishing rights and protections for literary works fixed on a tangible medium of expression.

76. 17 U.S.C. § 201(e) Involuntary Transfer.—When an individual author's ownership of a copyright, or of any of the exclusive rights under a copyright, has not previously been transferred voluntarily by that individual author, no action by any governmental body or other official or organization purporting to seize, expropriate, transfer, or exercise rights of ownership with respect to the copyright, or any of the exclusive rights under a copyright, shall be given effect under this title, except as provided under title 11.

77. 17 U.S.C. § 204(a) — A transfer of copyright ownership, other than by operation of law, is not valid unless an instrument of conveyance, or a note or memorandum of the transfer, is in writing and signed by the owner of the rights conveyed or such owner's duly authorized agent.

78. Lanham Act, Section 43(a) Section 43(a) provides, in relevant part: (1) Any person who, on or in connection with any goods or services ... uses in commerce ... any false designation of origin ... which— (A) is likely to cause confusion ... as to the origin ... of his or

her goods . . . . . shall be liable in a civil action by any person who believes that he or she is or is likely to be damaged by such act. 15 U.S.C. 1125(a) (Supp. IV 1992).

79. According to the federal research misconduct policy, research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. A). Fabrication is making up data or results and recording or reporting them; B). Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record. C). Plagiarism is the appropriation of another person's ideas, processes, results, or words without giving appropriate credit.[..]. Federal Register: December 6, 2000 (Volume 65, Number 235), pages 76260-76264, available online at https://www.govinfo.gov/content/pkg/FR-2000-12-06/pdf/00-30852.pdf accessed on 4/18/2020. Because the plagiarism element involved fixed work product on tangible medium of expression, plagiarism and copyright infringement are equivalent actions. 17 U.S. Code § 102 (a) states in relevant part "Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."

VI. STATEMENT OF FACTS

80. Defendant Mohan Kelkar's decision to allow publication of Infringing Works, regardless of Plaintiff's participation, was taken in his capacity as the chairman of the department.

81. Defendant Kelkar stated on record that he, as the "boss" of Plaintiff and of the infringer, and in his capacity of being the chairman of the department had authority to make

decisions to permit publications in violation of Plaintiff's copyright rights.

82. Defendant Kelkar had knowledge that his actions were contributing to the infringement as he asked the infringer not to inform Plaintiff of the publications.

83. Defendants Mohan Kelkar and Winona Tanaka, then worked together in a bid to conceal and avoid their liability resulting from their decisions in abetting the violation of Plaintiff's copyright rights.

84. Defendant Mohan Kelkar made factually incorrect statements to the faculty panel under the university's harassment policy to frame Plaintiff under the wrong university policy. Defendant Mohan Kelkar claimed some five of Plaintiff's students complained to him when Plaintiff's students actually wrote an endorsement which was never allowed by the panel to evaluate.

85. Then Defendant Mohan Kelkar embarked on a string of retaliatory actions.

86. First, even before any conclusions were made by any faculty panel on the issue of Infringing Works, Defendant Mohan Kelkar improperly contacted the chairperson of Plaintiff's tenure committee of the department of petroleum engineering and caused the Plaintiff's tenure to be denied.

87. Then, Defendant Mohan Kelkar, in retaliation for reporting of the falsification and fabrication issue in Infringing Work #1, spoke to Plaintiff's professional colleagues and advisors and spoke ill and made negative remarks about Plaintiff.

88. Further, as part of a coordinated effort, together with Defendant Winona Tanaka, Defendant Mohan Kelkar made untrue claims that Plaintiff came to his office and "verbalized" that Plaintiff gave up his copyright when the Infringing Works had not even been prepared by the infringer at the time of such a claim.

89. On belief, knowledge and available evidence, Defendant Mohan Kelkar still continues to make negative remarks about Plaintiff and continues to peddle the improper conclusions of the Defendant Tanaka's "final memorandum" that continues to violate Plaintiff's copyright rights.

90. Defendant Winona Tanaka knew of Plaintiff's objections to the violation of his copyright rights by infringer. Instead of preventing the violation, Defendant Tanaka actively permitted the publications and stated to the editors, of the journal publishers of Infringing Works, and other persons, that Plaintiff gave up his copyright rights when in fact Plaintiff objected.

91. Defendant Winona Tanaka then framed Plaintiff under TU's harassment policy for disagreeing with the publication of Infringing Works by asking a panel of non-experts under harassment policy to decide plagiarism, instead of following the ethical conduct policy.

92. That panel of non-experts admitted on October 28, 2011, they were "not charged to investigate" plagiarism under the ethical conduct policy.

93. In spite of the awareness of Plaintiff's objections, the same infringer again infringed on Plaintiff's copyright rights, on September 21, 2011, by secretively publishing Infringing Work #2.

94. Defendant Winona Tanaka then wrote a letter to the infringer's former advisor in India, around November 15, 2011, and made untrue statement that Plaintiff gave up his copyright rights to Infringing Work #2.

95. Defendant Winona Tanaka wrote the letter despite being aware that the infringer's former advisor, situated half the way across the world, had no role in the experimental research that Plaintiff created at Tulsa. Defendant Tanaka knew, or should have known, as she is a lawyer

herself, that it was unjust enrichment of someone who had zero presence on TU campus and zero participation in Plaintiff's original research program.

96. Plaintiff's objection to violation of his copyright rights were known to Defendant Winona Tanaka, as Tanaka acknowledged in the letter to the editor of Infringing Work #1 that Plaintiff refused to enter into any agreement.

97. Further, after initially making a decision to form an inquiry committee, Defendant Winona Tanaka backed out of that decision and instead made a unilateral, arbitrary, and unreasonable decision to abandon the process of inquiry and investigation.

98. Defendant Tanaka claimed in a recorded statement around February 2018 that she did not have the subject expertise in the Infringing Works and that she did "not investigate." Yet, Defendant Tanaka, and other TU officials, let the "final memorandum" that contains the exact opposite of Defendant Tanaka's admission stand.

99. Under TU's "Ethical Conduct Policy" when the decision to inquiry was already made, Defendant Winona Tanaka could not then unilaterally close that inquiry without completing that process.

100. Under TU's "Ethical Conduct Policy", TU was required to complete an inquiry with a committee of three subject matter experts with no unresolved conflict of interest and with one external member. Following the inquiry, TU was then required to decide on an investigation again with another three member committee comprising of different individuals, who are subject matter experts, not involved in the inquiry.

101. Thus, only an inquiry committee can decide whether or not to proceed or drop charges.

102. Defendant Tanaka, in the "final memorandum", manipulated evidence by first

redacting the faculty panel's admission that they did not investigate research misconduct, thereby covering-up the fact that there was no investigation under ethical conduct policy.

103. Then Defendant Winona Tanaka imputed the factually incorrect notion that the panel "investigated" plagiarism. Further, Defendant Winona Tanaka stated in the memorandum that the plagiarism was "investigated" and "re-investigated" when in fact there was not even an inquiry let alone an investigation.

104. Key witnesses such as Dr. Winton Cornell were never interviewed by Defendant Tanaka. None of Plaintiff's other students, except the infringer, were ever interviewed by Defendant Tanaka in the matter of copyright or any other matter..

105. In addition, on belief, available evidence and knowledge, Defendant Tanaka directly intervened, deterred, or otherwise obstructed the key witness, Dr. Cornell, from recording his witness statement to testify in the state court where the infringer had commenced a tort action.

106. Defendant Winona Tanaka then colored the "final memorandum" with additional prejudicial mischaracterizations that Plaintiff's objection to infringement of his copyright right was "defamatory", "malicious" and in "bad faith". But the faculty panel itself never made any such observations.

107. Defendant Winona Tanaka's factually incorrect statements in the final memorandum perpetuates the infringement of Plaintiff's copyright rights. The infringer continues to use that document to deny Plaintiff's copyright rights.

VII. CAUSES OF ACTION

FIRST CAUSE OF ACTION

108. Plaintiff restates and incorporates by reference into his first cause of action each

and every allegation set forth in this complaint.

109. The Copyrighted Works are Plaintiff's original literary work containing copyrightable subject matter for which copyright protection exists under the Copyright Act, 17 U.S.C. § 101, *et. seq*. Plaintiff is the exclusive owner of rights under copyright in and to the Copyrighted Works. Plaintiff owns a valid copyright registration for the Copyrighted Works, attached as **Exhibit A** and **Exhibit B**.

110. Plaintiff owns the copyright to the whole of the Infringing Works #1 and #2 under 17 U.S.C. § 201(b) as the Infringing Works were initiated by and done under Plaintiff's supervision with Plaintiff's express intention to publish those works and are WORK MADE FOR HIRE.

111. Infringer Prem Bikkina's conduct, alleged in complaint 4:20-CV-00536-GKF-JFJ, including reproduction, distribution, public display, sale or transfer of copyright of the Infringing Works #1 and #2 to journal publishing houses without notice and written consent, which are COPIED FROM, DERIVATIVE OF, AND SUBSTANTIALLY SIMILAR to Plaintiff's Copyrighted Work, without Plaintiff's written permission, led to direct infringement of Plaintiff's exclusive rights in the Copyrighted Works in violation of Section 501 of the Copyright Act, 17 U.S.C. § 501.

112. Defendant Mohan Kelkar and Defendant Winona Tanaka's conduct, alleged herein, leading to the direct infringement of Plaintiff's copyright rights, were made with the knowledge of Plaintiff's rights and with utter and reckless disregard of Plaintiff's rights and over the objections of Plaintiff. Defendants Mohan Kelkar and Winona Tanaka contributed materially to the willful and knowing infringement of Plaintiff's rights under 17 U.S.C. § 101, *et. seq*.

113. Defendants Mohan Kelkar and Winona Tanaka knew of the infringement, had a duty to prevent the infringement and also had the authority to prevent the violation of Plaintiff's copyright rights even after learning of Plaintiff's written objections.

114. Infringer Prem Bikkina did not possess exclusive rights to the Infringing Works. Defendants Mohan Kelkar and Winona Tanaka had no authority to permit transfer of copyright, exclusively, to the journal publishing houses without notification and written consent from Plaintiff and such transfer is in violation of 17 U.S.C. § 204(a).

115. On information, belief, and available evidence Defendant Mohan Kelkar's abetment of Prem Bikkina's infringing conduct, alleged in a separate complaint to this Court under 4:20-CV-00536-GKF-JFJ, was and continues to be willful and with full knowledge of Plaintiff's rights in the Copyrighted Works, and has enabled infringer Prem Bikkina to illegally obtain tangible and intangible benefits therefrom.

116. As a direct and proximate result of Defendant's contributory and vicarious infringing conduct alleged herein, Plaintiff has been harmed and is entitled to damages in an amount to be proven at trial. Pursuant to 17 U.S.C. § 504(b), Plaintiff is also entitled to recovery of Defendant's profits, accrued benefits, and judgment monies receivable that are attributable to and involving the infringing conduct alleged herein, and in the complaint against the direct infringer, including from any and all sales or transfer of the Infringing Work and products incorporating or embodying the Infringing Work, and an accounting of and a constructive trust with respect to such profits.

117. Alternatively, should Plaintiff choose to request statutory damages, Plaintiff is entitled to the maximum statutory damages pursuant to 17 U.S.C. § 504(c), in the amount of $150,000 for each of the Defendant's infringing conduct/for each of Plaintiff's works that has

been infringed, and for such other amount as may be proper pursuant to 17 U.S.C. § 504(c).

118. Actual harm caused by Defendant's infringing act includes denial of recognition and scholarship to Plaintiff to his own creations, denial of Plaintiff's right to free expression of scientific works embodied in the Infringing Works whose copyright rights actually belongs to Plaintiff and the denial of tenure at TU on account of the controversy concerning Infringing Works. Scientific research articles and presentations are the currency of scientists. Plaintiff's ability to use the research work in advancing his future professional qualifications and recognition of scholarship were severely affected.

119. Benefit and profit that infringer Prem Bikkina obtained from the infringing conduct were in the form of recognition and scholarship which was wholly denied to Plaintiff. In addition, infringer obtained a money judgment against Plaintiff in the state trial court as a direct benefit from his copyright infringement as alleged herein and from the presentation of improper evidence authored by Defendant Tanaka. Without the alleged copyright infringement there could have been no controversy.

120. In addition to direct benefits, infringer indirectly benefited, by transferring the copyright in violation of 17 U.S.C 204(a), and caused monetary benefits and unjust enrichment to others who are profiting from the Infringing Works by sale as well as unearned recognition such as the secondary authors in Infringing Work #2.

121. The Infringing Works are still online and are being sold, by the journal publishing house to whom Defendant Prem Bikkina transferred the copyright exclusively, and have been sold for the last 9 years or so to unknown number of purchasers across the world.

122. As a result of the acts described in the foregoing paragraphs, a substantial controversy of sufficient immediacy and reality exists to warrant the issuance of a preliminary

injunction, permanent in junction and declaratory judgment upholding Plaintiff's right, under 17 U.S.C. § 101 *et. seq*.

123. A judicial declaration is necessary and appropriate so that Plaintiff may ascertain his rights under the federal copyright and intellectual property laws.

124. Plaintiff is entitled to state this cause of action under 28 U.S.C. § 1331.

SECOND CAUSE OF ACTION

125. Plaintiff restates and incorporates by reference into his second cause of action each and every allegation set forth in this complaint.

126. Defendants violated Plaintiff's rights under Lanham Act, section 43(a) provisions when they misrepresented the source of origin of the contents published in the Infringing Work #1 and Infringing Work #2 to the editors, and other persons such as the professor from University of Texas, of Infringing Works.

127. Defendants further violated Plaintiff's rights under Lanham Act, section 43(a) provisions by permitting publication of Infringing Works #1 and #2 without consent, as the infringer's own exclusive work product and by allowing others, who had no contribution, to claim original source contribution by being co-authors.

128. Defendants caused harm to Plaintiff by not disclosing and not admitting the true origin of Infringing Works, by discrediting Plaintiff and by improperly crediting others who had no significant scientific contribution.

129. Defendants misappropriated Plaintiff's intellectual property and completely deprived Plaintiff of any recognition to the origin of the intellectual property contained in the Infringing Works.

130. Actual harm caused by Defendants infringing act includes denial of recognition

and scholarship to Plaintiff to his own creations, denial of Plaintiff's right to free expression of scientific works embodied in the Infringing Works whose origin was really from Plaintiff's intellectual creation. Scientific research articles and presentations are the currency of scientists. Plaintiff's ability to use the research work in advancing his future professional qualifications and recognition of scholarship were severely affected.

131. Further, actual harm caused by Defendants improper evidence, that TU investigated plagiarism under its ethical conduct policy and that Plaintiff gave-up his copyright rights, to a state court, resulted in violation of Plaintiff's constitutional rights. The infringer's negligent misrepresentation, relying on Defendants improper evidence, resulted in a disproportionate judgment in the state court and a violation of Plaintiff's fundamental right to speech made in attempt to prevent such infringement.

132. Benefit and profit that Defendants and TU, obtained from the infringing conduct, were in the form of recognition and scholarship attributed to TU which was denied to Plaintiff.

133. A judicial declaration is necessary and appropriate so that Plaintiff may ascertain his rights under the federal laws.

134. Plaintiff is entitled to state this cause of action under 28 U.S.C. § 1331.

Unless enjoined by this Court, Defendants will continue to infringe Plaintiff's rights by their actions and thereby cause further irreparable injury, as damages alone cannot fully compensate plaintiff for the ensuing harm. This threat of injury from continuing violations requires injunctive relief.

THIRD CAUSE OF ACTION

135. Plaintiff restates and incorporates by reference into his third cause of action each and every allegation set forth in this complaint.

136. Plaintiff has a right to express his scientific works which were his original creations through publications or at conferences or seminars.

137. Defendant's actions to permit direct infringement of his copyright rights denies Plaintiff his First Amendment rights to express his scientific work freely as the infringer transferred the copyright to Infringing Works on an exclusive basis to the journals that published Infringing Works.

138. Denial of Plaintiff's First Amendment right to publish his scientific work due to the exclusive transfer of copyright to the journals was without Due Process guaranteed under the Fourteenth Amendment of the Constitution of the United States.

139. Furthermore, Defendants action to allow the infringer to express the scientific work, which was copied from work originally created by Plaintiff, while denying that same publication rights to Plaintiff denies Equal Protection of Plaintiff's First Amendment rights guaranteed under the Fourteenth Amendment.

140. Plaintiff is entitled to state this cause of action under 28 U.S.C. § 1331.

VIII. REQUESTED RELIEF

WHEREFORE, Plaintiffs respectfully prays that this Court grant the following relief:

1. Assume jurisdiction over the case and reserve jury trial on all triable issues of fact;

2. Issue a declaratory judgment declaring that the conclusions of "final memorandum" issued by TU on May 28, 2013 violates plaintiff's rights under federal copyright laws and his constitutional rights; further issue a declaratory judgment declaring that the conclusions in TU's final memorandum of

"falsification", "fabrication" and "plagiarism", constituting copyright infringement in this case, are null and void;

3. Issue a temporary restraining order, preliminary and permanent injunction to prohibit the Defendants from publishing, promoting, or using the final memorandum, or its conclusions, for any purposes, including for legal purposes, to deny Plaintiff's federal copyright rights.

4. Issue a preliminary and permanent injunction directing the Defendants to retract the "final memorandum" from all the forums, journals, places and persons to which it was published to and direct the Defendants to retract any and all permissions, authorizations and decisions allowing the publication of Infringing Works.

5. Award preliminary and permanent injunctive relief to Plaintiff by equitably tolling the state of limitations for Plaintiff's copyright and intellectual property infringement claims and damages from at least August 26, 2013, and reserve jurisdiction in this Court to adjudicate those claims;

6. Hold Defendants jointly and severally liable for injuries suffered by Plaintiff and award Plaintiff all forms of damages; and

7. Grant such other prospective relief that is just, necessary, and appropriate to protect the rights of Plaintiff.

Under Federal Rule of Civil Procedure 11, by signing below, I certify to the best of my knowledge, information and belief that this complaint: (1) is not being presented for an improper purpose, such as to harass, cause unnecessary delay, or needlessly increase the cost of

litigation; (2) is supported by existing law or by a non-frivolous argument for extending, modifying, or reversing existing law; (3) the factual contentions have evidentiary support or, if specifically so identified, will have evidentiary support after a reasonable opportunity for further investigation or discovery and (4) the complaint otherwise complies with the requirements of Rule 11.

DATED: February 1, 2021

Respectfully submitted,

/s/

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Certificate of Registration

This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

United States Register of Copyrights and Director

Registration Number
TXu 2-148-355
Effective Date of Registration:
May 21, 2019

Title

Title of Work: Measurement of Interfacial Tensions and Wettability of Water-Carbon Dioxide-Quartz Systems at High Pressures and Temperatures.

Completion/Publication

Year of Completion: 2009

Author

- **Author:** Jagannathan Mahadevan
Author Created: text
Work made for hire: No
Citizen of: United States
Domiciled in: United States

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Rights and Permissions

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Certification

Name: Jagannathan Mahadevan
Date: May 21, 2019

Measurement of Interfacial Tensions and Wettability of Water-Carbon Dioxide-Quartz Systems at High Pressures and Temperatures.

Author:

Jagannathan Mahadevan

Created: 11-22-2009

Geological carbon sequestration in saline aquifers is considered as a promising method to reduce the emissions from anthropogenic carbon di-oxide (CO2). The injected CO2 is expected to stay in the saline aquifer for long times often lasting for thousands of years. The dynamics, and hence the storage integrity, of the multiphase CO2-water flow in the pore spaces of the rock critically depends upon rock-fluid interactions of which interfacial tension (IFT) between and contact angles between the CO2-water-rock substrate are key parameters. In this study we report measurements of IFT and contact angles of CO2-water-quartz system at reservoir conditions using a custom made experimental setup based on drop shape analysis and a comparison of the obtained data with the recently published data. This study differs from previous studies in the fact that the interfacial tensions were measured over long periods of time which ensures that the system achieves complete chemical equilibrium. IFT measurements are carried out between 200 to 2000psig and 25 to 60 °c which includes gas-liquid, liquid-liquid, and supercritical fluid- liquid phases. An integrated computer code, based on Redlich-Kwong equation of state, is used to obtain the saturated phase densities of CO2 rich and water rich phases and the results closely match the experimentally observed values. The phase densities are needed for measurements based on drop shape analysis. IFT between CO2 and water at a given temperature above the critical temperature decreased with the pressure and increased with the temperature at a given pressure. At 2000 psig, all the IFT measurements between 25 to 60 0c show a nearly constant value of ~23mN/m. Contact angles, measured between 200-2000psig and 25-40 °c through saturated water drop, is observed to be invariant and averages a value of ~46°.

Certificate of Registration

This Certificate issued under the seal of the Copyright Office in accordance with title 17, *United States Code*, attests that registration has been made for the work identified below. The information on this certificate has been made a part of the Copyright Office records.

United States Register of Copyrights and Director

Registration Number
TXu 2-156-594
Effective Date of Registration:
July 30, 2019
Registration Decision Date:
September 16, 2019

Title

Title of Work: Vapor Liquid Phase Equilibrium (VLE) Calculation and Interfacial Tensions Measurements of Water-Carbon Dioxide Systems at High Pressures: Application to Carbon Dioxide Sequestration.

Completion/Publication

Year of Completion: 2009

Author

- **Author:** Jagannathan Mahadevan
Author Created: text, photograph(s), computer program, artwork
Work made for hire: No
Citizen of: United States
Domiciled in: United States

Copyright Claimant

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Certification

Vapor Liquid Phase Equilibrium (VLE) Calculation and Interfacial Tensions Measurements of Water-Carbon Dioxide Systems at High Pressures: Application to Carbon Dioxide Sequestration.

Principal Investigator and creator: Jagannathan Mahadevan

Description of the Paper

This paper presents results of interfacial tension measurements at equilibrium conditions using the pendant drop method.

Interfacial Tensions of Water-Carbon Dioxide Systems at High Pressures: Application to Carbon Dioxide Sequestration

Problem Statement

Emissions of carbon dioxide (CO2), a greenhouse gas, may be mitigated by injection into saline aquifers for long term storage. The injected CO2 is expected to stay in the saline aquifer for long times often lasting for thousands of years. The dynamics of the multiphase flow in the pore spaces of the rock critically depends upon the familiar relative permeability and capillary pressure relationships which in turn are dependent on the interfacial properties of the rock-fluid interactions.

Objectives and Scope of Study

Our aim in this work is to investigate the interfacial tension of carbon dioxide systems at identical conditions as that of the reservoir during a typical CO2 injection process. We study the variation of the interfacial tension of the CO2-water system for pressures, ranging from 1 atmosphere to 136 atmospheres and temperatures ranging from 25 degree Celsius to 60 degrees Celsius. This study differs from previous studies in the fact that the interfacial tensions were measured over long periods of time which ensures that the system achieves complete chemical equilibrium. Additionally, a new equation of state model published in recent literature is incorporated into the phase density calculation procedure. Wettability measurements of water on quartz substrates with respect to CO_2 for different pressures are also made.

Method

We use the pendant drop method to calculate the interfacial tension of CO2-water systems at high pressures and temperatures. The high temperature visual cell consists of a 10,000psi rating cell with borosilicate glass windows for visualizing the drop. DropImage® software which uses the drop shape analysis to determine the interfacial tension is used. Data from the method is compared with results from previous studies using capillary rise method. The sessile drop method is used to measure the contact angle of water in CO2 system on quartz substrate.

Results and Observations

The interfacial tensions were found to be consistent with the data from literature measured by other methods such as capillary rise technique. The calculated phase densities for water rich liquid phase are comparable to correlations based on measured data. Equilibrium measurements of wettability of water on quartz substrate at different pressures show that the contact angle is around 46 deg at all pressures.

Conclusions

Interfacial tension between CO2 rich phase and water rich phase decreases with pressure to a stable value at a given temperature. The stability of the measured interfacial tension is achieved over a long period of time due to the long equilibration times of the two phases. Wettability of water on quartz substrate with respect to CO2 is unchanged with pressure at equilibrated conditions.

Abstract:

CO2 sequestration in saline aquifers is often proposed as a method to mitigate the carbon dioxide emissions in the atmosphere. When CO2 is injected in to a saline aquifer the injected CO2 displaces the resident brine and occupies the pores of the reservoir rock. Interfacial tension and wettability of CO2 water systems are important factors in determining the distribution and transport of CO2 in subsurface reservoirs. The interfacial tension for CO2-water systems is unlike other systems and is affected by the activity of CO2 in the non-aqueous phase.

Problem Statement

Carbon dioxide is one of the major constituents among the green house gases (GHG). CO_2 concentration in the atmosphere is increased from 280 ppm (on volume basis) during the pre-industrialization period to the current levels of 387 ppm (on volume basis as of March 2009). One of the reasons for this rapid increase in the atmospheric CO_2 concentration is burning fossil fuels.

Geological storage of CO_2 is considered as a promising option to reduce CO_2 atmospheric emissions. Geological storage of CO_2 includes sequestration in mature oil& gas reservoirs, saline aquifers and unminable coal beds etc. All the above except storage in the saline aquifers involves a very high transportation (from the point of emission to the sequestration site) costs and also the capacity of the reservoirs to hold very large quantities of CO_2.

Injection of carbon dioxide into subsurface formations requires post injection verification of the integrity of the geological formation which can prevent the escape of injected fluids back into the atmosphere. This study focuses on the effects of rock and fluid interactions such as interfacial tension and the wettability on the distribution of the carbon dioxide and water in geologic systems.

2) Objectives

This work aims to generate IFT data between water/brine-CO2 (gas, liquid and super critical) at different pressures and temperatures, using saturated phase densities instead of pure component densities. Additionally wettability of various mineral substrates is measured using the contact angle method.

3) Methodology

Pendant drop method is used for IFT measurement and scissile drop method is used for contact angle measurement. A custom made high pressure (10000psia) and temperature (200^0C) withstandable IFT machine with fluid saturation and circulation system is used for the measurements.

The approach and algorithm used in Karsten et al., is adopted to calculate the equilibrium phase densities for CO_2-rich phase. The correlation for aqueous phase density is adapted from Hebach et al.

4) Description of Apparatus

The equipment used for the purpose of measuring IFT& contact angles is a custom made high pressure and temperature instrument (69 MPa and 450 degF design pressure and temperature). Following are the important parts of the machine.

4.1 IFT Cell

4.1.1. **Stainless steel cell** with three ports for fluid inlet, outlet and temperature and pressure measurement.

4.1.2. **Two thick borosilicate glass windows** to observe the drop. Glass windows are fixed, parallel to each other, to the cell using high pressure, temperature, CO_2 resistant o-rings and seals.

4.1.3. **Two stainless steel nozzles**, one to make a drop and the other to hold the base which supports the substrate.

4.2 Fluid saturation and circulation system

4.2.1. **Two pumps**, which can pump supercritical fluids, to pump droplet phase fluid and the external phase fluid.

4.2.2. **Two stainless steel cylinders** to pre-saturate the droplet phase fluid and the external phase fluid.

4.2.3. **10,000 psia rated stainless steel tubing** to connect all the above individual parts to make a high pressure fluid saturation and circulation loop. Industrial grade CO2 (99.5 mole percent purity) and ultrapure Millipore water (18.2 MΩ3 cm) were used for all IFT measurements.

The fluid saturation and circulation system primarily consists of syringe pumps, saturation vessels, and stainless steel tubing. Two pulsation-free syringe pumps (Teledyne ISCO model 260D) with a controller (D-series) are used to pump supercritical fluid, droplet phase fluid, and external phase fluid. A third pump (Eldex, Optos Series, model 2) was used for cleaning the IFT cell using acetone and Millipore water. After water flushing, the view cell was flushed with CO2 for about 5 min to ensure that air was completely displaced from the view cell. It was also used to make a stable drop, during the drop-making step. Two 316 stainless steel saturation vessels (maximum working pressure of 69 MPa at 450 K) are used to presaturate the droplet phase fluid and the external phase fluid.

4.3 Drop image analysis

4.3.1. **One CCD camera** to record the drop image and a back ground light source.

4.3.2. **One PC with Rame-hart's drop image software** installed.

5) Modeling Description and Calculations of Densities

Pendant drop method is used to measure IFT between water-rich phase and CO_2-rich phase. Inputting correct densities for each phase is extremely important to get accurate IFT measurements. There are some published experimental IFT measurements for CO_2-water system, but, most of them used pure component phase densities at corresponding pressure and temperature instead of equilibrium (saturated) phase densities. Therefore, we started reviewing different published data (both experimental and model derived) and concluded to use Spycher et al., approach to calculate CO_2-rich phase density and Hebach et al., correlation (derived from experiments) to calculate water-rich phase. The algorithm to calculate phase densities are based on the method outlined in Spycher et al. approach for CO_2-rich phase density and Hebach et al., correlation for water-rich phase density. These methods are described in the attached Appendix titled VLE Calculations for CO2_H2O System. Spycher et al approach compares well with experimental solubilities from 15-100 ^{0}C and 60MPa.

Hebach et al., conducted a series of experiments to measure phase densities for water-rich phase (for CO_2-water system) for pressures ranging from 1-30MPa and temperatures 284 to 332 K (around 9-60 ^{0}C). They developed a correlation to predict the water-rich phase (for CO_2-water system) densities within their experimental conditions.

The following equations describe the model used in this study.

$$V^3 - V^2\left(\frac{RT}{P}\right) - V\left(\frac{RTb}{P} - \frac{a}{PT^{0.5}} + b^2\right) - \left(\frac{ab}{PT^{0.5}}\right) = 0 \qquad (1)$$

The above equation is the Redlich-Kwong equation of state for pure components. For mixture a and b (a represents measures of intermolecular attraction and b represents the measures of intermolecular repulsion) would be modified as a_{mix} and b_{mix} respectively. a_{mix} and b_{mix} can be calculated from the following standard mixing rule (Prausnitz and others, 1986),

$a_{mix} = \left(y_{H2O}{}^2\, a_{H2O} + 2\, y_{H2O}\, y_{CO2}\, a_{H2O-CO2} + y_{CO2}{}^2\, a_{CO2}\right)$ (2)

$b_{mix} = \left(y_{H2O}\, b_{H2O} + y_{CO2}\, b_{CO2}\right)$ (3)

from equation (1) and the mixing rules (2)& (3), fugacity coefficient ϕ_i, of component k in mixtures with other components i can be calculated as,

$$\ln(\phi_k) = \ln\left(\frac{V}{V-b_{mix}}\right) + \left(\frac{b_k}{V-b_{mix}}\right) - \left(\frac{2\sum y_i\, a_{ik}}{RT^{1.5} b_{mix}}\right)\ln\left(\frac{V+b_{mix}}{V}\right) + \left(\frac{a_{mix} b_k}{RT^{1.5} b_{mix}{}^2}\right)\left[\ln\left(\frac{V+b}{V}\right) - \left(\frac{b_{mix}}{V+b_{mix}}\right)\right] - \ln\left(\frac{PV}{RT}\right) \quad (4)$$

From the definition of fugacity and partial pressures, it is known,

$$f_i = \phi_i y_i P_{tot} \quad (5)$$

where f_i, ϕ_i and y_i are the fugacity, fugacity coefficient, and mole fraction of component i in the gas phase, respectively, and P_{tot} is the total pressure

$$f_{H_2O} = \phi_{H_2O} y_{H_2O} P_{tot} = K_{H_2O}\, a_{H_2O(l)} \quad (6)$$

$$f_{CO_2} = \phi_{CO_2} y_{CO_2} P_{tot} = K_{CO_2(g)} a_{CO_2(aq)} \quad (7)$$

where, $K_{H_2O} = f_{H_2O(g)} / a_{H_2O(l)}$ and

$K_{CO_2} = f_{CO_2(g)} / a_{CO_2(aq)}$

Where, K_{H_2O} and $K_{CO_2(g)}$ are “true” equilibrium constants as defined above, f_{H_2O} and f_{CO_2} are fugacities of the gas components and $a_{H_2O(l)}$ and $a_{CO_2(aq)}$ are activities of components in the aqueous liquid phase. Values of K_{H_2O} and $K_{CO_2(g)}$ vary with temperature and pressure. The temperature dependence is taken into account by expressing these equilibrium constants as a polynomial function of temperature (at one bar, and H_2O saturation pressures above 100°C). The pressure correction at a given temperature is approximated by,

$$K_{(T,P)} = K^{O}{}_{(T,P^O)} \exp\left(\frac{(P - P^O)\overline{V}_i}{RT}\right) \quad (8)$$

Where, $\overline{V}_i$ is the average partial molar volume of the pure condensed component i over the pressure interval P^0 to P, and P^0 is a reference pressure, here taken as 1 bar (and H2O saturation pressure above 100°C). Because $\overline{V}_i$ also varies with temperature (much less than with pressure), $\overline{V}_i$ is also averaged over the temperature range of interest so that $K_{(T,\ P)}$ values can be approximated from one constant $\overline{V}_i$ value for each component.

From equations (6) and (8), water mole fraction in the gas phase can be written as,

$$y_{H_2O} = \frac{K^{O}{}_{H2O}\, a_{H2O}}{\phi_{H2O}\, P_{tot}} \exp\left(\frac{(P - P^O)\overline{V}_{H_2O}}{RT}\right) \quad (9)$$

The mole fraction of aqueous CO_2 (x_{CO_2}) is calculated from its molality m_{CO_2},

$$x_{CO_2} = \frac{m_{CO_2}}{m_{CO_2} + m_{H_2O}} = \frac{m_{CO_2}}{m_{CO_2} + 55.508} \quad (10)$$

By convention, $a_{CO_2} = m_{CO_2}\gamma$, where γ = activity coefficient of dissolved CO2 on a molality scale. For this electrically neutral species, if no salts are present, the activity coefficient is set to $\gamma = \frac{1}{\left(1 + \frac{m_{CO_2}}{55.508}\right)}$, which is a molality to mole fraction correction yielding a unit activity coefficient on the mole fraction scale.

Since the solubility of CO2 in water is small, $a_{CO_2} = 55.508\, x_{CO_2}$ (11)

By substituting equations (11) & (8) into (7) gives,

$$x_{CO_2} = \frac{\phi_{CO_2}(1 - y_{H_2O})P_{tot}}{55.508\, K^{O}{}_{CO_2(g)}} \exp\left(\frac{(P - P^O)\overline{V}_{CO_2}}{RT}\right) \quad (12)$$

Equations (10) and (12), can be solved by setting,

$$A = \frac{K^{O}{}_{H_2O}}{\phi_{H_2O}\, P_{tot}} \exp\left(\frac{\left(P - P^{O}\right)\overline{V}_{H_2O}}{RT}\right) \qquad (13)$$

$$B = \frac{\phi_{CO_2} P_{tot}}{55.508\, K^{O}{}_{CO_2(g)}} \exp\left(\frac{\left(P - P^{O}\right)\overline{V}_{CO_2}}{RT}\right) \qquad (14)$$

So that,

$$y_{H_2O} = \frac{(1-B)}{\left(\frac{1}{A} - B\right)} \qquad (15)$$

Knowing y_{H_2O}, aqueous phase CO_2 mole fraction is given by the following equation,

$$x_{CO_2} = B\left(1 - y_{H_2O}\right) \qquad (16)$$

To solve for y_{H_2O} and x_{CO_2} equations (1) to (4) and (13) to (16) should be solved simultaneously and this requires an iterative calculations. To make the calculations simple, Spycher et al. assumed the y_{H_2O} = 0 in the equations (2) and (3). Hence, the fugacity coefficients are calculated in non-iterative manner. The strongly non-ideal behavior is still captured through the molecular interaction parameters. Equilibrium constants, average partial volumes and Redlich-Kwong parameters are calculated using regression analysis on the experimental data available.

For water-rich phase density calculation the approach from Hebach et al is used. The phase density values computed using this algorithm and the experimental results obtained from Chiquet et al. work are compared.

		Chiquet et al., Experimental Results	Model Results using Spycher et al., approach	
P(MPa)	T(K)	□mix, CO2-rich phase(g/cc)	□mix, CO2-rich phase(g/cc)	Absolute Deviation
5	307.4	0.1263	0.1166	0.0097
7	309.6	0.2217	0.2101	0.0116
10	308.1	0.7105	0.6942	0.0163
15	307.8	0.8133	0.7951	0.0182
20	308.1	0.8639	0.8509	0.0130
25	307.6	0.8992	0.8953	0.0039
30	308.1	0.9272	0.9268	0.0004
40	308.8	0.97	0.9769	-0.0069
45	309	0.9875	0.9977	-0.0102
P(MPa)	T(K)	□mix, CO2-rich phase(g/cc)	□mix, CO2-rich phase(g/cc)	Absolute Deviation
5	322.8	0.105	0.1046	0.0004
7	323.7	0.1722	0.1702	0.0020
10	324.2	0.377	0.4024	-0.0254
15	323.6	0.6915	0.6803	0.0112
20	323.1	0.7783	0.7692	0.0091
25	323.5	0.829	0.8227	0.0063
30	323.3	0.8659	0.8657	0.0002
40	323.6	0.9191	0.9274	-0.0083
45	324.4	0.9397	0.9497	-0.0100

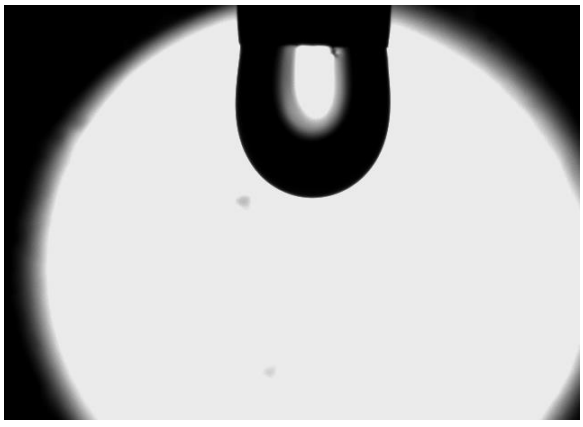
Table1: Comparing experimental and model derived equilibrium phase density values for CO_2-rich phase

		Chiquet et al., Experimental Data	Hebach et al., Correlation		
P(MPa)	**T(K)**	**□mix, H2O-rich phase(g/cc)**	**□mix, H2O-rich phase(g/cc)**	**% Deviation**	**Absolute Deviation**
5	307.4	0.9927	1.0060	-1.339780397	-0.0133
7	309.6	0.9726	1.0080	-3.639728563	-0.0354
10	308.1	1.0068	1.0110	-0.41716329	-0.0042
15	307.8	1.0049	1.0140	-0.905562743	-0.0091
20	308.1	1.0102	1.0160	-0.574143734	-0.0058
25	307.6	1.0182	1.0190	-0.078570026	-0.0008
30	308.1	1.0208	1.0210	-0.019592476	-0.0002
40	308.8	1.0243	1.0260	-0.165967002	-0.0017
45	309	1.0261	1.0280	-0.185167138	-0.0019
P(MPa)	T(K)	**ρmix, H2O-rich phase(g/cc)**	**ρmix, H2O-rich phase(g/cc)**	% Deviation	Absolute Deviation
5	322.8	0.9962	0.9968	-0.06022887	-0.0006
7	323.7	0.9958	0.9989	-0.311307491	-0.0031
10	324.2	0.9959	1.0010	-	-0.0051

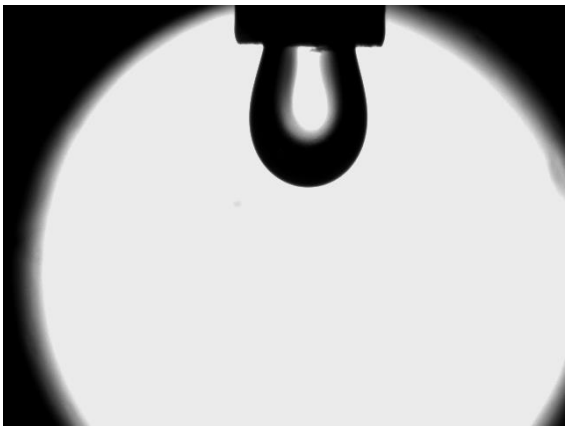
				0.512099608	
15	323.6	0.9996	1.0050	-0.540216086	-0.0054
20	323.1	1.0044	1.0080	-0.358422939	-0.0036
25	323.5	1.0076	1.0100	-0.238189758	-0.0024
30	323.3	1.0099	1.0130	-0.306961085	-0.0031
40	323.6	1.016	1.0180	-0.196850394	-0.0020
45	324.4	1.019	1.0200	-0.098135427	-0.0010

Table2: Comparing two experimental and model derived equilibrium phase density values for water-rich phase

6) Measurements of IFT

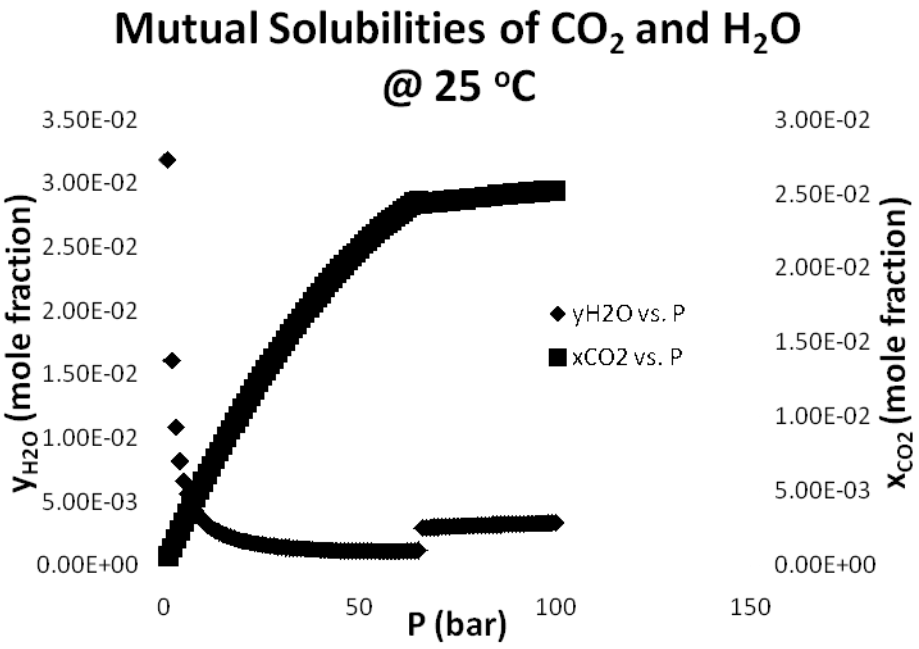


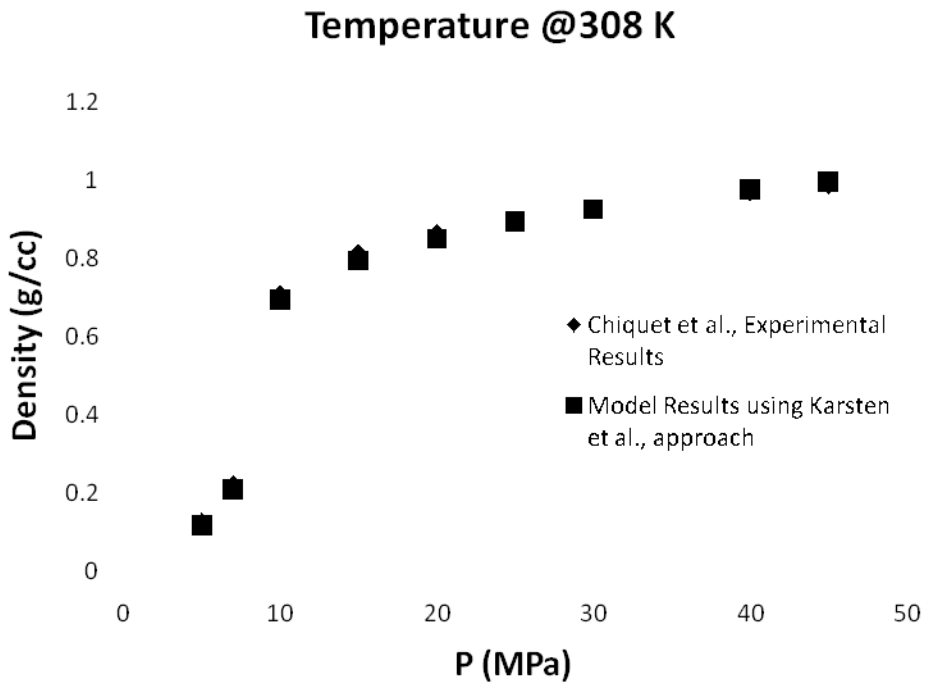
Drop of water-rich phase in the CO_2-rich phase at 68F and 304psig

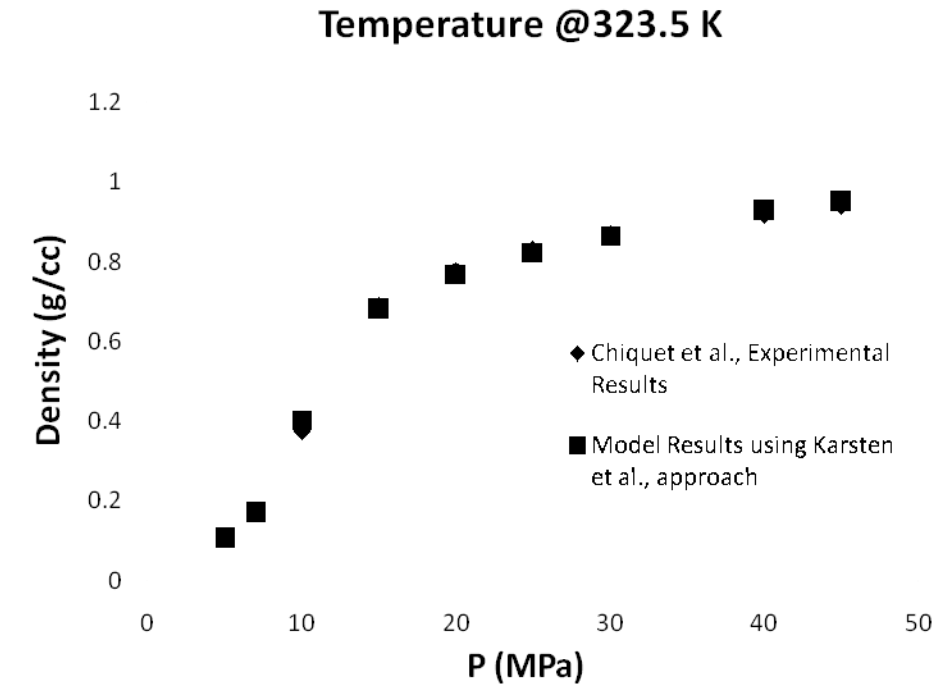


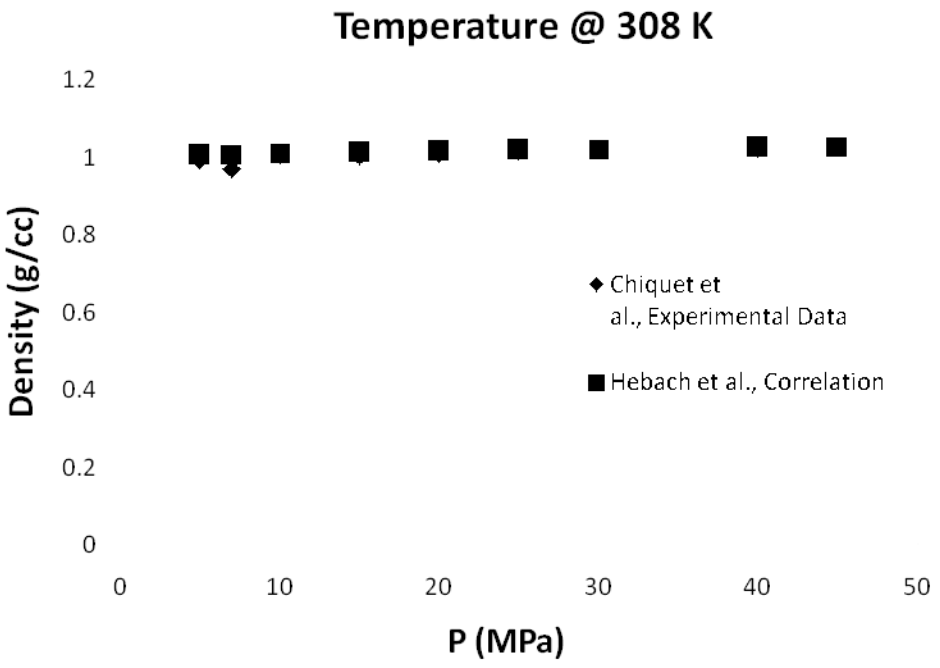
Drop of water-rich phase in the CO_2-rich phase at 68F and 862psig

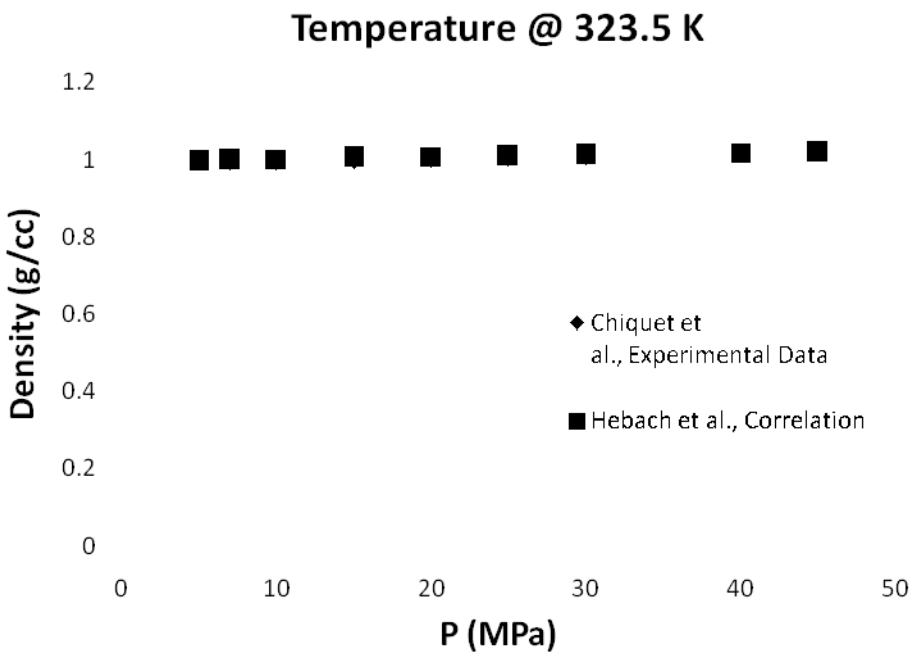
7) Results

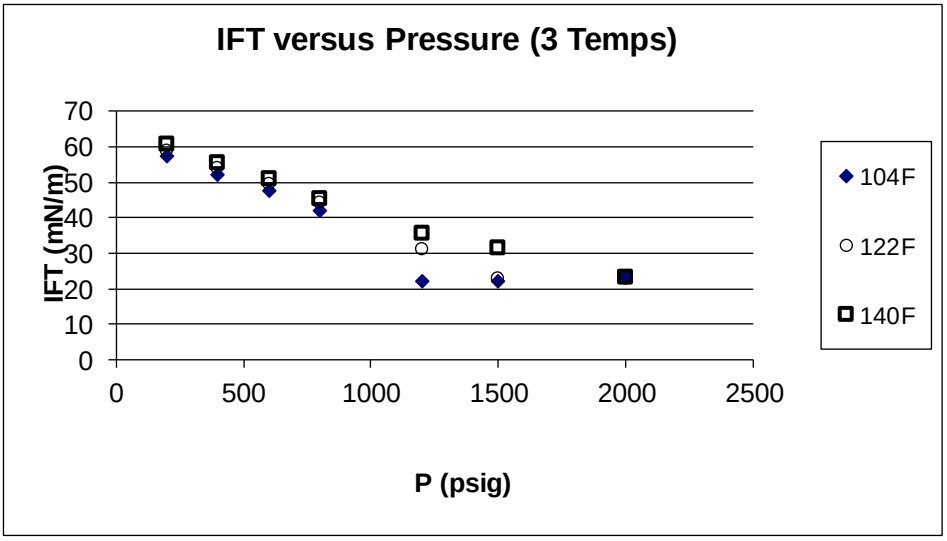

Mutual Solubilities of CO_2 and H_2O @ 25 °C
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
y_{H2O} (mole fraction)
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
x_{CO2} (mole fraction)
yH2O vs. P
xCO2 vs. P
0
50
100
150
P (bar)

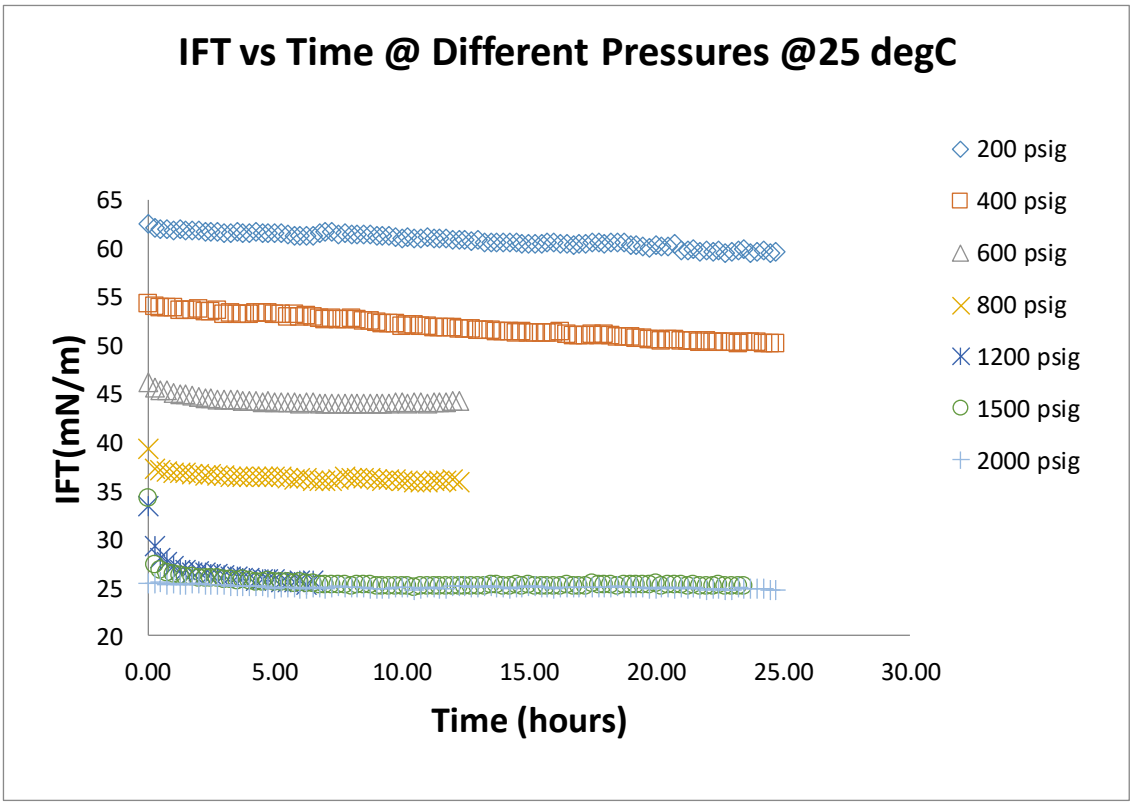

Temperature @308 K
1.2
1
0.8
0.6
0.4
0.2
0
Density (g/cc)
Chiquet et al., Experimental Results
Model Results using Karsten et al., approach
0
10
20
30
40
50
P (MPa)

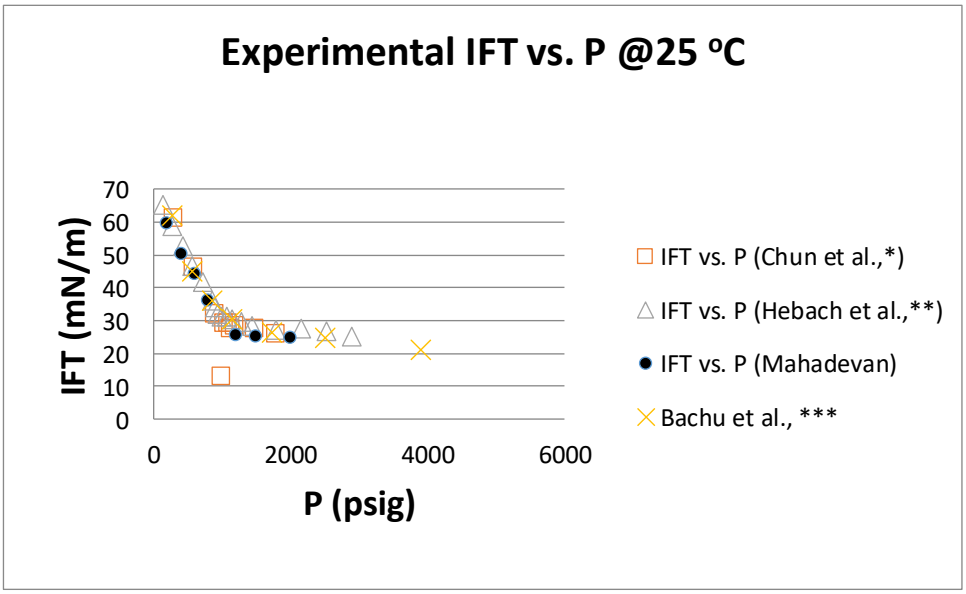

Temperature @323.5 K
Density (g/cc)
1.2
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40
50
P (MPa)
Chiquet et al., Experimental Results
Model Results using Karsten et al., approach

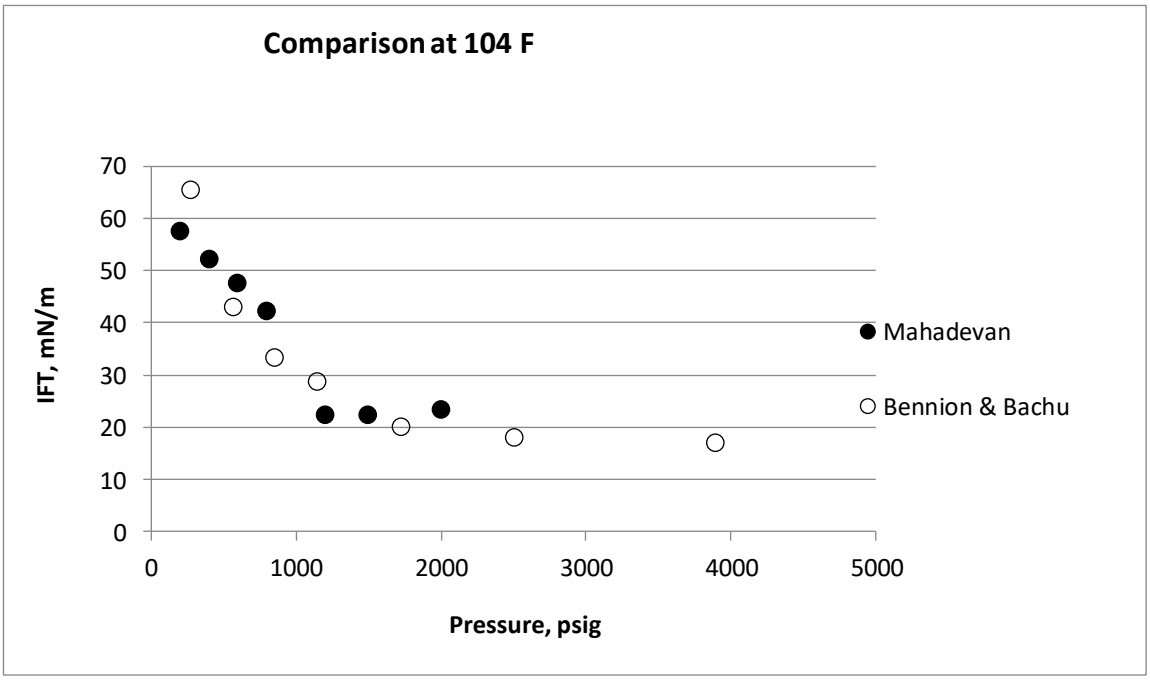

Temperature @ 308 K
Density (g/cc)
1.2
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40
50
P (MPa)
Chiquet et al., Experimental Data
Hebach et al., Correlation


Temperature @ 323.5 K
Density (g/cc)
1.2
1
0.8
0.6
0.4
0.2
0
0
10
20
30
40
50
P (MPa)
Chiquet et al., Experimental Data
Hebach et al., Correlation


IFT versus Pressure (3 Temps)
IFT (mN/m)
70
60
50
40
30
20
10
0
0
500
1000
1500
2000
2500
P (psig)
104F
122F
140F


IFT vs Time @ Different Pressures @25 degC
IFT(mN/m)
65
60
55
50
45
40
35
30
25
20
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Time (hours)
200 psig
400 psig
600 psig
800 psig
1200 psig
1500 psig
2000 psig


Experimental IFT vs. P @25 ºC
IFT (mN/m)
70
60
50
40
30
20
10
0
0
2000
4000
6000
P (psig)
IFT vs. P (Chun et al.,*)
IFT vs. P (Hebach et al.,**)
IFT vs. P (Mahadevan)
Bachu et al., ***



References:

1. Dickson, J. L., Gupta, G., Horozov, T. S., Binks, B. P., and Johnston, K.P., "Wetting Phenomena at the CO_2/Water/Glass interface," Langmuir 2006 22 (5), Pages 2161-2170.

2. Bachu, S., Bennion, D. B. "Interfacial Tension between CO2, Freshwater, and Brine in the Range of Pressure from (2 to 27) MPa, Temperature from (20 to 125) deg C, and Water Salinity from (0 to 334000) mg/L", J. Chem. Eng. Data, 54 (2008), pages 765–775.

3. Chiquet, P., Broseta, D. and Thibeau, S., "Wettability alteration of caprock minerals by carbon dioxide," Geofluids, Volume 7 (2007) Pages 112-122.

4. Spycher, N., Pruess, K., Ennis-King, J., "CO2-H2O mixtures in the geological sequestration of CO2. I. Assessment and calculation of mutual solubilities from

12 to 100°C and up to 600 bar," Geochimica et Cosmochimica Acta, Volume 67, Issue 16 (2003), Pages 3015-3031.

5. Hebach, A., Oberhof, A., and Dahmen, N., "Density of Water+ Carbon Dioxide at Elevated Pressures: Measurements and Correlation," Journal of Chemical & Engineering Data, 49 (4) 2004, Pages 950-953.

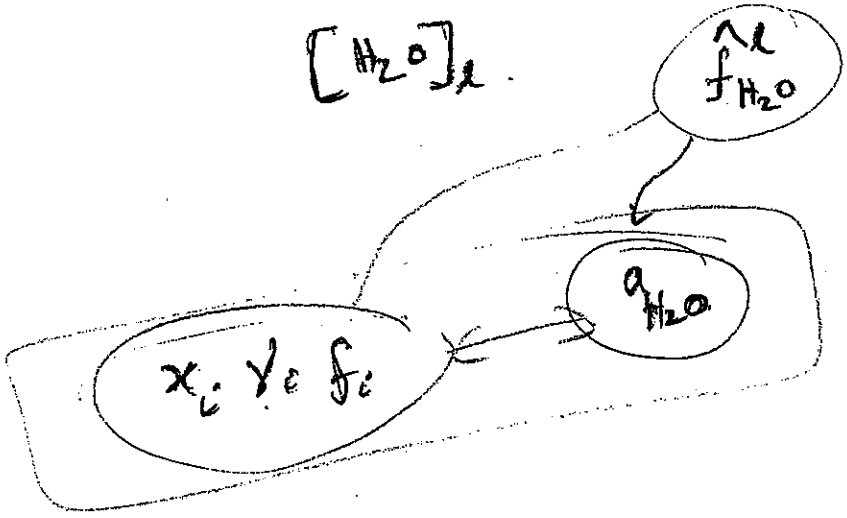
VLE Calculations for a CO_2–H_2O System.

$$aA + bB \rightleftharpoons cC + dD.$$

$$K = \frac{[C]^c\,[D]^d}{[A]^a\,[B]^b}$$

$$[C] = \text{activity of } C = \text{activity of } C$$

$$K = \frac{[H_2O]_g}{[H_2O]_l} \Rightarrow \frac{\hat{f}^g_{H_2O}}{\hat{f}^l_{H_2O}}$$



$M_i = M_i(T, P_i)$
(T, P)

Composition Solution :

$$A = \frac{K^\circ_{H_2O}}{\phi_{H_2O} P_{tot}} \exp\left[\frac{(P - P^\circ)\bar{V}_{H_2O}}{RT}\right] \quad -(1)$$

$$B = \frac{\phi_{CO_2} P_{tot}}{55.508\, K^\circ_{CO_2(g)}} \exp\left[-\frac{(P - P^\circ)\bar{V}_{CO_2}}{RT}\right] \quad (2)$$

$$y_{H_2O} = \frac{(1 - B)}{\left(\frac{1}{A} - B\right)} \quad (3)$$

$$x_{CO_2} = B(1 - y_{H_2O}) \quad (4)$$

Calculation of Equilibrium Constants, $K^\circ_{H_2O}$; $K^\circ_{CO_2(g)}$

$$\log (K^\circ_i)_{T,\,1\,bar} = a + bT + cT^2 + dT^3 \quad (5)$$

[T used in °C]

$\bar{V}_i$ given by Table 2 in Spycher et al.

Fugacity coefficient Calculation :

$$\ln(\phi_k) = \ln\left(\frac{V}{V-b_{mix}}\right) + \left(\frac{b_k}{V-b_{mix}}\right) - \left(\frac{2\sum y_i a_{ik}}{RT^{1.5} b_{mix}}\right) \ln\left(\frac{V+b_{mix}}{V}\right) + \left(\frac{a_{mix} b_k}{RT^{1.5} b_{mix}^2}\right)\left[\ln\left(\frac{V+b}{V}\right) - \left(\frac{b_{mix}}{V+b_{mix}}\right)\right] - \ln\left(\frac{PV}{RT}\right) \quad (6)$$

[in the above the EOS Solution is used ^ largest molar volume. from]

$$\begin{cases} a_{mix} = \sum\sum y_i y_j a_{ij} \\ b_{mix} = \sum y_i b_i \end{cases} \quad (7)$$

Cubic Eos solution for V:

$$V^3 - V^2\left(\frac{RT}{P}\right) - V\left(\frac{RTb_{mix}}{P} - \frac{a_{mix}}{PT^{0.5}} + b^2\right) - \frac{a_{mix}b_{mix}}{PT^{0.5}} =$$

(8.)

y_i, x_i, V_l, V_g $\quad \Sigma y_i = 1$, $\Sigma x_i = 1$

Step by Step

→ Create cells in Xcel for y_i, x_i

→ Populate these cells with guess values

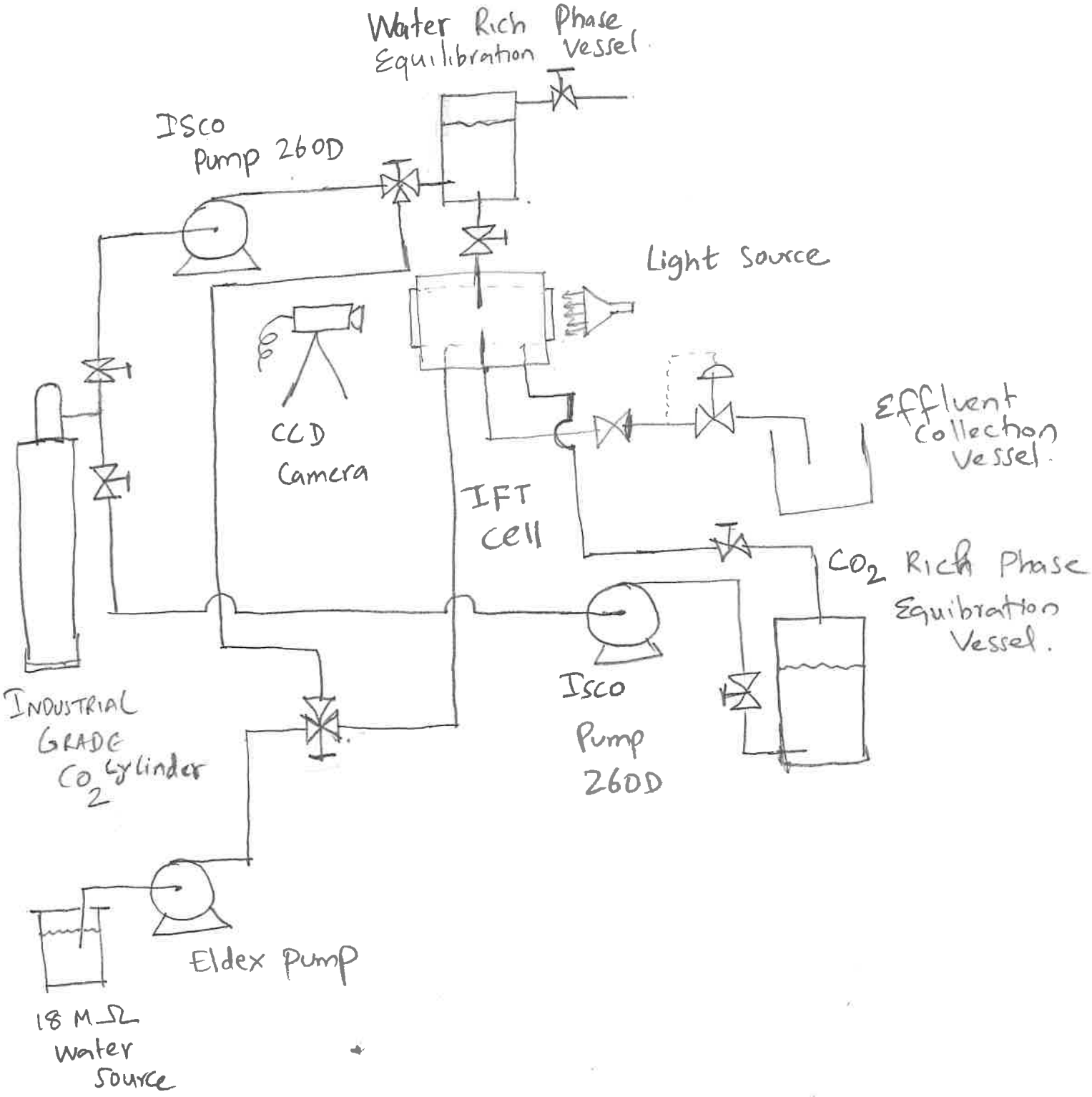
→ Calculate a_{mix}, b_{mix}, (use → Table 1, eq. 7 (CLARY LIKE)) and → eq. (7) the roots of Cubic EOS.

→ take the largest root V_{large}. (because of Gas) gas occupies the highest volume

→ Calculate ϕ_k.

→ Calculate y_i, x_i in a Seperate Set of Cells. based on eqs. (3) and (4)

→ Use Xcel Solver to make the difference between the "guess" cells and "result" cells zero.


Water Rich Phase Equilibration Vessel
ISCO Pump 260D
Light Source
CCD Camera
IFT Cell
Effluent Collection Vessel
CO_2 Rich Phase Equilibration Vessel
INDUSTRIAL GRADE CO_2 Cylinder
ISCO Pump 260D
Eldex Pump
18 MΩ Water Source

jagannathan mahadevan

From: Redner, Richard
Sent: Saturday, May 21, 2011 8:46 PM
To: Prem Bikkina; Mahadevan, Jagan
Cc: Tanaka, Winona
Subject: Re: Provost's action

Dear Prem and Jagan,

I had hoped that my final communication with you would be to tell you that things were settled and I appreciated the give and take that you have both showed in these negotiations. But I am sorry to inform you that the situation is on hold because questions have been raised by the Provost's Office regarding the nature and scope of the agreement to "settle" and "resolve" the disputes between you. This is not intended to be a roadblock or a problem, but I have been informed that the issues raised by both sides must be addressed and resolved in a way that is consistent with University policy. This will help the Provost's Office insure that the University and the interests of both parties will be adequately served by whatever has been agreed to.

Second, I am officially notifying you that neither of you may use any information or correspondence exchanged during the negotiations. I have been asked by the Provost's Office to instruct you that you are not authorized to use any such information and you are specifically prohibited against sharing such information with the publisher or anyone other than me, the Provost, and the Vice Provost, Winona Tanaka. Unless and until a settlement is finalized, it would be ***unethical*** of either party to use or refer to anything communicated during negotiations, especially since anything said during negotiations is, by its very nature, tentative and entirely dependent on reaching an acceptable settlement.

If a mutually acceptable settlement is not reached, the slate will be wiped clean and we will have lost all that we have achieved. So I sincerely hope that you will abide by these instructions and work with the Provost's Office to finalize an agreement.

The remaining steps will be handled by the Provost's Office. To insure that all university policies are followed, you will be working directly with the Vice Provost. She will be out-of-town on business until late Wednesday, but will she will try to meet with each of you as soon as possible. You can call Patt Joyce at 918-631-2554 or email her at patricia-joyce@utulsa.edu if you wish to make an appointment to meet with Winona Tanaka on Thursday or Friday. She will be meeting with each of you separately at first. If you don't initiate contact with Patt, she will be asked to contact you.

Once again, I want to thank each of you for continuing to work with me on this very difficult problem. I have the greatest confidence in the Vice Provost to handle all aspects of these final stages of the negotiations fairly and in good faith. As someone who has relied on her judgment for many years, I hope that you will listen carefully to the instructions and advice that she gives you.

Sincerely,

Richard A. Redner
Associate Dean of Research and Graduate Studies

Tanaka, Winona

om:	Mahadevan, Jagan
ent:	Friday, June 03, 2011 8:21 AM
To:	Tanaka, Winona
Cc:	Redner, Richard
Subject:	RE: My response to your requests for revision - Confidential Settlement & Release Agreement - FINAL DRAFT

Dear Winona,

Thanks for the suggestions and your time.

I have read the changes and the comments. Although I have agreed to some of your recommendations I do have reservations on some issues. I have stated my agreements embedded within your previous response within quotes (<>). The issues which I am unable to submit to your suggestions are as follows:

1. Approvals: Although the student had approvals from my colleagues to send the manuscript to a journal, they were merely restating the university policy to the student. This, however, does not mean that the student can (a) withhold information from the readers and reviewers with the intention of "proving" a scientific hypothesis; (b) deny me, a significant contributor to the research, co-authorship and/or the chance to address my genuine concerns of contamination which were highlighted well before the said approvals were given, (c) deny me the right to read the paper before the paper was sent for peer review;

The approval from my colleagues should have been taken in the right spirit by the tudent and sadly this was not to be. Merely stating that the approvals were facts does not d cannot absolve the student from due diligence required from the student, as highlighted above, and therefore cannot be construed as approval for the technical content of the paper. Indeed, I request to know, how is it that the faculty's approvals, who have professed lack of technical specialty in the specified area, be construed as an approval for the technical content of the paper? I also request to know, how is it that the faculty's said approvals, can be construed as an approval to the completeness of the paper when it is a fact that they were not party to the research? I wish to know if the said approvals are simply based on a matter of believing the word of the student over my word over the completeness? Even so I have reproduced the students own words that were not part of the original manuscript as evidence. If after this statement of fact the collegial faculty's approval is still being regarded as approval for completeness, I rest my case. I will still engender the belief that there exists a bias because not all statement of facts are being considered in making the conclusion that the faculty gave approvals and the word approval is not defined well.

2. Withdrawal of specific email complaints to Provost by Prem Bikkina: It is well known that I entered in to negotiations with the student via the good offices of Dr. Redner who I trusted and trust. At the end of negotiations I was asked by Dr. Redner to approve that his observations were correct and report that to Provost Blais. The Provost means everything to me and more than any one else in the scientific community. When I wrote the email, I assumed that the negotiations were completed.

In this stage of discussions with your office you asked me to start discussions from the point where I left the agreement with Dr. Redner. And you yourself mentioned that all you are doing is to start from where Dr. Redner and I stood before the issue came to your fice. Unfortunately, Bikkina, on the other hand raised issues that did not figure in the gotiations completed by Dr. Redner. Therefore it is my understanding that the matters that came after my discussions with Dr. Redner, including issues raised by Bikkina to the Provost, must be addressed separately in this document which is prepared by your office and to be endorsed by the Provost.

3. Future Issues: I feel that any data coming out of my lab should be published as long as they are legitimate and they are scholarly. I also feel that endorsing the students view of whether the document is legitimate and complete, undermines the role of a faculty adviser. Also, every scholarship that comes out of a lab is meant to enhance the profile of research in the lab and encourage scholarship from future students. I must say the publication of incomplete, and manipulated scholarship dents my ability as a faculty to build a strong research program. In this particular case I identified the problems 2 years ago through alerts but the student chose to ignore them. I feel that the future issues should be reworded in a way that addresses my above concerns and at the same time does not accord blanket denial of rights to publish as you have mentioned.

Thus, I am unable to endorse a written statement that does not address my core concerns as stated above. In the event that the Provost sends the manuscript without the written agreement, I request that the revised manuscript be sent to the editor, as that is a statement of fact and not a point of negotiation. I pray that I also be given the freedom to make my concerns about impropriety clear to the editor. I expect that, with the addition of the facts of the experiment as per the revised manuscript, my concerns, to the editor, will be largely limited to the technical content and the technical consistency as opposed to impropriety.

Additionally, in the absence of this agreement, I wish to reserve my rights to co-authorship and and do not give any rights for single authorship to Prem Bikkina. This is because of the fact that I too have made significant contributions to the work and I was and am the principal investigator in this research.

Kindly also provide me a reply as to,
1. what will happen during the investigation with respect to regular functions of proposal submission etc., 2. whether I will have a chance to know the accusations from the student and defend them accordingly.
3. Also please state if the student will be required to provide evidence for the accusations.
4. If after the investigation, the students accusations are proven false then what action will be taken on the student.

Finally, in the event that this proceeds to investigation, I request that I be accorded adequate protection from the students malicious acts or vengeful behavior during a process of investigation and request that the students access to my labs, offices or assistant's material be completely restricted. Currently, the student is placed in the same room as that of my assistant and he has access to all the project related materials and access to the lab. Additionally, the student also has access keys to my lab in L118, and my students offices in L103. I request that the student be placed in a lab or office that is completely removed from access to the materials that concern my research or other students.

Many Thanks and Best regards,
Jagan Mahadevan
Assistant Professor
Petroleum Engineering
The University of Tulsa
Tulsa, OK 74104

From: Tanaka, Winona
Sent: Thursday, June 02, 2011 6:37 PM
To: Mahadevan, Jagan

THE UNIVERSITY of TULSA

OFFICE OF THE PROVOST

June 6, 2011

Dr. Stefan Bachu, Associate Editor
International Journal of Greenhouse Gas Control

RE: Prem Bikkina's Paper Entitled, "*Contact Angle Measurements of CO2-Water-Quartz/Calcite Systems in the Perspective of Carbon Sequestration*," Paper JGGC-D-11-00015R2

Dear Dr. Bachu:

I am forwarding to you a revised version of Mr. Bikkina's paper and requesting that the editors of your Journal conduct such further reviews and evaluations that you deem necessary in order to proceed towards publication.

As you are already aware, objections were raised earlier by Dr. Jagan Mahadevan regarding Mr. Bikkina's paper. During the past several weeks, University faculty and administrators worked extensively with Dr. Mahadevan and Mr. Bikkina in order to see whether their differences could be resolved amicably. During the course of such negotiations, the paper was revised to incorporate suggestions made by Dr. Mahadevan. The revised paper being submitted to you at this time includes all of the revisions requested by Dr. Mahadevan, even though Mr. Bikkina is no longer obligated to accept Dr. Mahadevan's suggestions. The agreed-upon revisions are highlighted so that the changes can be easily identified and reviewed. Specifically, two paragraphs have been added. One paragraph appears at the bottom of page 14, and the other paragraph appears at the top of page 15. In addition, three additional references to literature have been added. Mr. Bikkina's paper, as revised, has been reviewed by two senior faculty in our McDougall School of Petroleum Engineering and Department of Mechanical Engineering, respectively, and both of these faculty support the publication of Mr. Bikkina's paper in its current, revised form.

Until late this week it appeared that, in exchange for Mr. Bikkina's agreement to make the requested revisions to his paper, Dr. Mahadevan would withdraw his objections to the paper, acknowledge that Mr. Bikkina was acting with his (Dr. Mahadevan's) permission while conducting research and gathering data under Dr. Mahadevan's supervision, and acknowledge that he had already given Mr. Bikkina permission to publish this paper as a single author paper. However, because we were unable to reach closure on a settlement agreement, Dr. Mahadevan now expresses an intent to renew all of his earlier objections to Mr. Bikkina's paper.

800 South Tucker Drive • Tulsa, Oklahoma 74104-9700 • 918-631-2554 • Fax 918-631-2721

My office and the Graduate School have no doubt that the differences between the parties go beyond the content of Mr. Bikkina's paper. In fact some issues are wholly unrelated to the paper. The University will pursue such matters through normal channels. We do not believe that our internal proceedings should interfere with the submission at this time of Mr. Bikkina's paper to your Journal. The Dean and Associate Dean of our Graduate School, the Chair of Petroleum Engineering and Mr. Bikkina's Advisors and Dissertation Directors in our McDougall School of Petroleum Engineering and Department of Mechanical Engineering, and I believe that Mr. Bikkina's paper is now ready for re-submission and consideration by your Journal for publication. In making this submission, we ask that your editorial staff allow this paper to undergo your normal review processes and that every possible consideration be given to publishing Mr. Bikkina's paper.

Please do not hesitate to contact me if you have any questions or require any additional information from the University of Tulsa. We appreciate your patience in giving us an opportunity to attempt to resolve matters amicably, and deeply regret that the delay did not result in the anticipated resolution.

Sincerely,

Roger N. Blais
Provost and Vice President for Academic Affairs

cc: Dr. Stefan Miska, Acting Chair of the McDougall School of Petroleum Engineering
Dr. Janet A. Haggerty, Dean of the Graduate School
Mr. Prem Bikkina

THE UNIVERSITY of TULSA

OFFICE OF THE PROVOST

December 1, 2011

Dr. Ramgopal Uppaluri
Associate Professor
Department of Chemical Engineering
IIT Guwahati
Guwahati 781039

Re: Mr. Prem Bikkina's Rights

Dear Dr. Uppaluri:

As Provost and Chief Academic Officer of The University of Tulsa, I am writing to advise you of this University's position regarding co-authorship claims recently made to you by Dr. Jagan Mahadevan.

As you know, Mr. Prem Bikkina is a Ph.D. student in our McDougall School of Petroleum Engineering. Recently, he co-authored a paper with you and Dr. Ovadia Shoham entitled, "Equilibrated Interfacial Tension Data of the CO_2 Water System at High Pressures and Moderate Temperatures." Dr. Jagan Mahadevan is currently an Assistant Professor in the same department as Dr. Shoham and Mr. Bikkina. In recent emails to you, Dr. Mahadevan has claimed that he is entitled to be recognized as a co-author in this publication.

After conducting a thorough and careful review of our records, we have determined that Dr. Mahadevan previously disclaimed ownership of the data and all rights to co-authorship of any papers written by Mr. Bikkina regarding data collected while working under Dr. Mahadevan's supervision. Dr. Mahadevan first disclaimed those rights in April, 2010. Since then, on several different occasions involving several different faculty and faculty administrators, Dr. Mahadevan affirmed his disclaimers and made it clear that he does not wish to be associated either with the data or with any papers written by Mr. Bikkina. Dr. Mahadevan's disclaimers have been relied upon by Mr. Bikkina, our faculty, and our faculty administrators. Indeed, they have followed Dr. Mahadevan's explicit instructions that Mr. Bikkina "*not use my name in any scientific publications pertaining to the data you have collected...*" These and other such disclaimers clearly show that Dr. Mahadevan has given up all rights to co-authorship.

Dr. Mahadevan's recent efforts to retract his earlier disclaimers and to now assert a claim for co-authorship cannot be respected. We have advised Mr. Bikkina that he is not obligated to respond to Dr. Mahadevan's demands. Mr. Bikkina has the right to use data collected while he worked under Dr. Mahadevan's supervision, and Mr. Bikkina is not obligated to notify or

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seek Dr. Mahadevan's approval before using such data. Mr. Bikkina is not obligated to give any credit to Dr. Mahadevan, nor is he obligated to give Dr. Mahadevan any co-authorship status.

If you have any questions or require additional information, please do not hesitate to contact me or our Vice Provost, Winona Tanaka, at winona-tanaka@utulsa.edu. You may also refer any further inquiries regarding Dr. Mahadevan's claims to my office. We are prepared to handle such inquiries.

Sincerely yours,

Roger N. Blais

Dr. Roger N. Blais
Provost

cc: Dr. Ovadia Shoham
Mr. Prem Bikkina

Discussed 12/20/11 MP
Prem RR WP WT

Tanaka, Winona

From: Mahadevan, Jagan
Sent: Saturday, December 17, 2011 10:24 PM
To: Tanaka, Winona
Subject: RE: Research Misconduct Case

Winona,

I understand your situation.

I reiterate I never granted carte blanche permission. The emails you are quoting and that the faculty are quoting are all information taken out of context. I have always maintained that the particular data that the student has is contaminated and that is all.

Prem has not only collected data that is contaminated but also data that is completely different from the experimental setup which are now the point of these debates. We have even submitted paper proposals to conference together, that is not contaminated, which was later then submitted by the student without me as co-author. Long story short, there is other data which are collected which are not contaminated but incomplete.

For instance he has worked on salt deposition and evaporation which I directed and he has left it incomplete. I have worked on these areas for the last 10 years and I have even patented some invention which I have assigned to TU. I feel that the route and strategy adopted by TU on the debates between me and Prem are making an initial mistake even more erroneous. If the senior faculty have acted immaturely and without following due process should I be the subject of a harassment case?

First, my proposition is to stop any more publications by the student, effective of the date I last informed you of the second publication(Saturday, December 03, 2011 5:45 PM), as I do not give him permission at all. I also demand to know what other publication is being prepared or already prepared and submitted and when it was submitted by the student. Please let me know about this and then we can take the misconduct discussion forward accordingly.

Secondly, if the above is answered to my satisfaction and appropriately, then I would like to keep the misconduct discussion to the fact why the student originally withheld data in his first publication to the Journal of Greenhouse Gas Control (entitled "Contact angle measurements of CO2-water-quartz/calcite systems in the perspective of carbon sequestration") and what is the action TU would take regarding that. Please remember that this was the main reason why I contacted the editor which prompted him to retract the original submission. You would well remember that TU then revised the paper by adding the contamination information.

Also, please be aware that the undergraduate students of TU are subject to strict codes of conduct. If that is the case why should graduate students be exempt from the same policies?

Best regards,
Jagan Mahadevan
Assistant Professor
Petroleum Engineering
The University of Tulsa
Tulsa, OK 74104

From: Tanaka, Winona
Sent: Friday, December 16, 2011 4:53 PM
To: Mahadevan, Jagan

Subject: Research Misconduct Case

Dear Jagan,

I acknowledge your request to leave Dr. Shoham out of this but, quite frankly, your request simply cannot be granted.

A preliminary review of the record shows that you participated in a series of email exchanges, phone calls and face-to-face conversations with not only Mr. Bikkina, but also with Dr. Mohan Kelkar, Dr. Ovadia Shoham, Dr. Ram Mohan, and Dr. Richard Redner regarding issues of co-authorship and use of data by Mr. Bikkina. These individuals either exchanged emails or participated in conversations directly with you, or they were brought into the discussion as faculty and faculty administrators who needed to be involved in the process. The record suggests that all of these individuals - not just Mr. Bikkina - believed that you had disassociated yourself and disclaimed ownership of all data generated by Mr. Bikkina while he worked under your supervision. All of them believed that you considered the data to be spurious, contaminated and not worthy of publication or use. All of them believed that you no longer wished to supervise Mr. Bikkina, and that you had given explicit instructions that Mr. Bikkina not use your name in any scientific publications he might write regarding these data. These faculty and faculty administrators relied on your statements. They advised Mr. Bikkina that he could use the data and publish papers without seeking your approval and without granting you co-authorship status. Indeed, all of them specifically instructed Mr. Bikkina that he was not to use your name in any way in writing any paper about the data, believing that to be consistent with your wishes. All of them believed that your disclaimer of ownership of the data and co-authorship rights applied broadly and across-the-board, not just for the first paper that Mr. Bikkina might write but also for any subsequent papers that he might write with the data.

For these reasons, your allegations of research and academic misconduct against Bikkina necessarily challenge not only the integrity and reputation of Mr. Bikkina, but also the integrity and reputation of Dr. Kelkar, Dr. Shoham, Dr. Moham, and Dr. Redner.

Based on your allegations of research misconduct and co-authorship rights, I have initiated proceedings under the University of Tulsa's policy entitled, "Ethical Conduct in Academic Research and Scholarship" ("Ethical Conduct Policy"). These proceedings will examine the conduct of not only Mr. Bikkina, but also Dr. Kelkar, Dr. Shoham, Dr. Mohan, Dr. Redner. Your conduct will also be examined, based on the belief of Mr. Bikkina and other parties that you are not entitled to co-authorship rights and that, by making such demands, you are improperly interfering with the authorship rights of Mr. Bikkina and Dr. Shoham. Thus, the proceedings will require investigation of not only your allegations but also the allegations made by Mr. Bikkina and others regarding your claims to co-authorship and rights to the data.

I have begun the process of assembling a Committee of Inquiry pursuant to the procedures required under the Ethical Conduct Policy. However, as you know, the University of Tulsa will be closed for Winter Break from December 23, 2011 until January 2, 2012. Also, as I understand from your earlier email, you are now out of the country and will not return to Tulsa until January. Given the Winter Break and your own travel schedule, I do not intend to convene any Committee until early January. I will let you know the specifics as they become available. (In response to your question, this Committee and process will indeed be separate from the process followed for investigating Mr. Bikkina's Harassment Complaint.)

In order to allow the process to proceed promptly in January, please submit any mation you wish to have considered by the Committee of Inquiry by Friday, January 6, You can make your submissions electronically to me by email, if you wish. I will be responsible for gathering materials for the Committee.

Again, I feel compelled to say that I deeply regret that we are again dealing with a dispute. Unfortunately this one is a bit more complex, because Mr. Bikkina is not the only one involved. Others have now been brought into the situation. I told you from the outset that I am prepared to do whatever I can to pursue an amicable, reasonable settlement these disputes. Our efforts to reach a settlement last summer failed for reasons that I explained to you at that time, primarily because your demands were not acceptable under University policies and practices. My offer to work with you and others towards reaching an amicable, reasonable settlement stands.

Please accept my best wishes to you and your family as this year comes to a close.

Sincerely,

Winona

Winona M. Tanaka
Vice Provost & Associate Vice President
for Academic Affairs
The University of Tulsa
800 South Tucker Drive
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(918) 631-3054
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UNITED STATES DISTRICT COURT FOR THE NORTHERN DISTRICT OF OKLAHOMA

CIVIL ACTION NO. 20-CV-536-JFH-JFJ
[ORIGINALLY 4:20-CV-02561 - TRANSFERRED FROM SOUTHERN DISTRICT OF TEXAS]

JAGAN MAHADEVAN
Plaintiff(s),

Against

PREM BIKKINA
1 TO 30 DOES
Defendant(s).

DECLARATION OF ALAN R. PRICE

Alan R. Price, Ph.D., pursuant to 28 U.S.C. § 1746, hereby declares as follows:

1. I am over 18 years of age, of sound mind, and otherwise competent to make this Declaration. The evidence set out in the foregoing Declaration is based on my personal knowledge.

2. I am a resident of Travis County, Texas.

3. I have worked continuously as an expert consultant since 2006 (Price Research Integrity Consultant Experts) for many institutional research officers, United States Government Department of Justice (DOJ) attorneys, and individual complainants and respondents who needed my assistance in dealing with institutional research misconduct investigations.

   From 1987 to 2006, I served as a scientist for the Federal Department of Health and Human Services (HHS) in the U.S. Public Health Service (PHS) and its National Institutes of Health (NIH), working administratively (and publishing papers) as an aging grants program officer, human subjects protection officer, and (from 1989 to 2006) research misconduct Scientist-Investigator, Division Director, and Associate Director for the Office of Research Integrity (ORI).

   From 1970 to 1987, I worked at the University of Michigan (UMI), doing research in my laboratory with my undergraduate and graduate students, publishing research papers with them and teaching biochemistry courses, as well serving as Assistant Dean for Research for the UMI Medical School and then as Assistant/Acting Associate Vice President for Research for the whole UMI.

Specifically, I have more than four decades of working experience at UMI, NIH, and ORI in reviewing misconduct allegations, advising institutional officials on their cases, conducting myself inquiries and investigations, writing and reviewing inquiry and investigation reports, including my decisions as to whether the evidence was sufficient to make findings of plagiarism, falsification, and/or fabrication in each case.

4. I have published two dozen peer-reviewed scientific, technical research articles based on work done individually and collaboratively with undergraduate and graduate students, faculty colleagues, technicians, etc. I also have published a dozen administrative papers dealing with evaluation of research misconduct policies and specific cases of plagiarism, falsification and/or fabrication that were handled by ORI. I have also conducted two dozen investigations and written reports for, or advised on, institutional investigations for universities, DOJ, and ORI on such research misconduct matters.

5. Jagan Mahadevan has provided me documents related to the handling by the University of Tulsa of his allegations of plagiarism, falsification, and fabrication, including unauthorized use of his abstract contents, equipment design, and algorithms; attribution of his work to other authors who had no role in the research program; his appeals of this mishandling; and declarations and depositions made in the court case. Exhibit 1 is a true and correct copy of the materials that I have reviewed in this case.

6. My review of these materials in this case showed its elements are similar to the plagiarism, falsification, and fabrication allegations and evidence that I received and reviewed at the UMI and ORI. This case includes allegations of failures to accurately report methods employed and data obtained, and failures to give appropriate credit for work done and supported by others, which could have led lead to findings of plagiarism, falsification, or fabrication in research if an investigation had been appropriately conducted under the University of Tulsa's Ethical Conduct in Academic Research and Scholarship Policy, through inquiry and investigation by committee (at least three faculty without conflicts of interest and having the appropriate expertise for evaluating the case).

7. I conclude from my review of these documents that the issues of plagiarism, falsification and fabrication in the scientific articles by Prem Bikkina at the center of the State court case were not investigated by the University of Tulsa. While the Senior Vice Provost and Provost had decided in December 2011 to conduct an inquiry, the University did not do an actual inquiry or investigation into the specific allegations of Jagan Mahadevan.

8. I have not testified in any previous case between the parties in this matter. I will be able to prepare a detailed expert opinion on the issues of investigation of plagiarism, falsification and fabrication for this case, and to testify to its contents at trial.

I declare under penalty of perjury that the foregoing is true and correct.

If called to testify in this matter, I would testify truthfully, based on my expert opinion and personal knowledge of the documents that were submitted to my attention.

Executed on December 7, 2020, at Lago Vista, Texas.

Alan R. Price

Alan R. Price, Ph.D.

List of documents reviewed by Alan R. Price, Ph.D. December 7, 2020

UNIVERSITY AND FEDERAL POLICIES:

University of Tulsa Ethical Conduct in Academic Research and Scholarship Policy
https://utulsa.edu/research/office-research/research-compliance/ethical-conduct-in-academic-research-and-scholarship/

University of Tulsa Policy on Harassment
https://utulsa.edu/wp-content/uploads/2015/04/Policy-on-Harassment.pdf

Federal Policy on Research Misconduct, The White House Office of Science and Technology, Federal Register, Vol. 65, No. 235, pp. 76260-76264, December 6, 2000
http://www.gpo.gov/fdsys/pkg/FR-2000-12-06/html/00-30852.htm

CURRICULUM VITAE:

Curriculum vitae of Jagannathan Mahadevan, 2015

EMAILS, LETTERS, MEMORANDA, REPORTS AND PAPERS:

Dr. Jagan Mahadevan's compiled emails between him and Associate Editor Stefan Bachu, *International Journal of Greenhouse Gas Control*; Chaired Professor and Chairman of Department of Petroleum Engineering Mohan Kelkar; and Endowed Professor of Engineering Stefan Mijska, between April 24 and 28, 2011 [TU Attachment #11]

> Chaired Professor and Chairman of Department of Petroleum Engineering Mohan Kelkar's email to Dr. Jagan Mahadevan, copied to Endowed Professor of Engineering Stefan Miska, on report of impropriety in manuscript, April 28, 2011, 6:58 AM

Dr. Jagan Mahadevan's compiled emails between him and Stefan Bachu, Associate Editor, International Journal of Greenhouse Gas Control; Mohan Kelkar, Chaired Professor and Chairman of Department of Petroleum Engineering; and Stefan Mijska, Endowed Professor of Engineering, between April 24 and 28, 2011 [TU Attachment #12]

Graduate School Associate Dean for Research Richard Redner's email to Chaired Professor and Chairman of Department of Petroleum Engineering Mohan Kelkar, copied to Graduate School Dean Janet Haggerty and Vice President Al Sotlow, on report of impropriety in manuscript, April 28, 2011, 9:05 AM [TU Mahadevan Exhibit 14]

Dr. Jagan Mahadevan's compiled emails between him and Graduate School Associate Dean for Research Richard Redner (on alleged impropriety in Prem Bikkina's manuscript), May 19-20, 2011 [TU Attachment # 13a(1)]

> Email from Graduate School Associate Dean for Research Richard Redner to Dr. Jagan Mahadevan, May 20, 2011, 7:12 AM
>
> Email from Graduate School Associate Dean for Research Richard Redner to Dr. Jagan Mahadeva and Prem Bikkina, May 21, 2011, 8:46 PM

Dr. Jagan Mahadevan's compiled emails between him and Senior Vice Provost Winona Tanaka on draft settlement agreement, between June 1 and 2, 2011 [TU Attachment #15a]

Dr. Jagan Mahadevan's compiled emails between him and Senior Vice Provost Winona Tanaka on draft settlement agreement, between June 1 and 3, 2011 [TU Attachment #15b]

> Email from Jagan Mahadevan to Senior Vice Provost Winona Tanaka, June 3, 2011, 6:21 AM

Dr. Jagan Mahadevan's compiled emails between him and Senior Vice Provost Winona Tanaka on draft settlement agreement, between June 4 and 6, 2011 [TU Attachment #16]

> Email from Senior Vice Provost Winona Tanaka to Dr. Jagan Mahadevan, June 6, 2011, 3:34 PM

Dr. Jagan Mahadevan's letter to Provost Roger Blais, as complaint against Prem Bikkina for defamation, harassment, and research misconduct, July 22, 2011

Dr. Jagan Mahadevan's addendum to original harassment complaint dated July 22, 2011 (undated, ~August 2011)

Dr. Prem Kumar Bikkina's Paper #1, in *International Journal of Greenhouse Gas Control* 5 (2011) 1259–1271, published online on July 27, 2011

Dr. Prem Kumar Bikkina's *et al.* Paper #2, in *Journal of Chemical & Engineering Data* 56 (2011) 3725–3733, published September 21, 2011

Dr. Jagan Mahadevan, Letter to the Editor [Comments on Bikkina paper #1], in *International Journal of Greenhouse Gas Control* 7 (2012) 261–262 (September 5, 2011, published online on October 8, 2011)

Dr. Prem Kumar Bikkina's Letter to the Editor [Reply to comments by Jagan Mahadevan on Bikkina paper #1], in *International Journal of Greenhouse Gas Control* 7 (2012) 263–264 (October 14, 2011, published online on November 30, 2011)

University of Tulsa Investigatory Committee report, October 28, 2011

Provost Roger Blaise decision memorandum Dr. Jagan Mahadevan, November 21, 2011

Senior Vice Provost Winona Tanaka's email to Jagan Mahadevan (responding to his questions in an email on January 11, 2012), January 19, 2012, 10:20 AM

Senior Vice Provost Winona Tanaka's email to Dr. Jagan Mahadevan (stating that March 8, 2012, to be a new deadline for him to make additional submission), March 2, 2012, 10:19 AM

Dr. Jagan Mahadevan's email to Senior Vice Provost Winona Tanaka with his Complaint letter (filename: Research Misconduct Case_Mar 2012.pdf) on student academic and research misconduct by Prem Bikkina, March 16, 2012, 4:57 PM

Dr. Jagan Mahadevan response to the Senior Vice Provost and the Investigatory Committee to allegations made by Prem Bikkina, (undated)

Dr. Jagan Mahadevan's email to Graduate School Dean Janet Haggerty, with allegations of plagiarism issue in Dissertation, April 19, 2013, 9:56 AM

Graduate School Dean Janet Haggerty's email to Dr. Jagan Mahadevan (acknowledging his 9:56 AM email and forwarding it to Senior Vice Provost Winona Tanaka, as the Office of the Provost was more familiar with his situation), April 19, 2013, 10:10 AM

Senior Vice Provost Winona Tanaka's Decision Memorandum to Dr. Jagan Mahadevan, May 28, 2013

DECLARATIONS:

Declaration by Dr. Jagan Mahadevan, with exhibits, July 11, 2014

Declaration by Dr. Winton Cornell, Professor, Department of Geosciences, July 11, 2014

Declaration by Dr. Prem Bechuana, 2013 Ph.D. graduate from University of Tulsa in Petroleum Engineering (with Rebuttal_IJGGC as response to queries by Dr. J. Mahadevan, and Revised Manuscript1_JGGC on Carbon Angle Measurements), July 11, 2014

Declaration, in Reply to Declaration of Dr. Prem Bikkina, by Dr. Winton Cornell, Professor, Department of Geosciences, July 11, 2014

Declaration by Dr. Winona Tanaka, Senior Vice Provost, July 22, 2014

Reply Declaration by Winton Cornell, Professor, Department of Geosciences, July 28, 2014

DEPOSITIONS:

Transcript of deposition of Winona Tanaka, Senior Vice Provost, November 6, 2017

Transcript of deposition of Ovadia Shoham, Professor, Department of Petroleum Engineering, November 6, 2017

Transcript of deposition of Richard Redner, Associate Dean for Research and Graduate Studies, November 7, 2017

Transcript of deposition of Mohan Kelkar, former Chairman, Department of Petroleum Engineering, December 18, 2017

PUBLICATIONS:

P.K. Bikkina, "Contact Angle Measurements of CO_2-Water-Quartz/Calcite Systems in the Perspective of Carbon Sequestration," *The International Journal of Greenhouse Gas Control* 5, 1259–1271 (2011)

P. K. Bikkina, O. Shoham, and R. Uppaluri, "Equilibrated Interfacial Tension Data of the CO_2 Water System at High Pressures and Moderate Temperatures", *Journal of Chemical Engineering Data* 56, 3725–3733 (2011)

J. Madahaven, "Comments on the paper titled 'Contact angle measurements of CO_2–water-quartz/calcite systems in the perspective of carbon sequestration': A case of contamination?" *International Journal of Greenhouse Gas Control* 7, 261–262 (2012)

P.K. Bikkina, "Reply to the comments [by Dr. Mahadevan] on "Contact angle measurements of CO_2–water–quartz/calcite systems in the perspective of carbon sequestration," International Journal of Greenhouse Gas Control 7, 263–264 (2012)

and papers by others including comments on the Bikkina paper results:

S. Wang et al., Environmental Science and Technology 47, 234–241 (2013) at p. 235
S. Iglauer et al., *Internat. Journal of Greenhouse Gas Control* 22, 325-328 (2014) at p. 327
R. Farookhpour et al., *Energy Procedia* 37, 5339-5351 (2013) at pp. 5340 and 5349
S. Saraji et al., *SPE International* 160208 (2012) at p. 2
S. Saraji et al., *Langmuir* 29, 6856–6866 (2013) at p. 6857