

**AFFIDAVIT OF DR. ROBERT C. BLOCK**

This confidential affidavit of Robert C. Block is made in connection with the investigation currently in process at Purdue University. I, Robert C. Block, being first duly sworn on oath, state that if called upon as a witness in this cause, I would be competent to testify as to the following:

1. I am making this affidavit of my own personal knowledge. If called as a witness, I would testify to the truth of the facts contained in this affidavit.
2. I am a Fellow of the American Nuclear Society. I obtained my Ph.D. from Duke University, and I was a Senior Scientist/Physicist at Oak Ridge National Laboratory ("ORNL"). I have served as Associate Dean of Engineering and as a past Head of the School of Nuclear Engineering at the Rensselaer Polytechnic Institute ("RPI").
3. In addition to being a Fellow at ANS, I have been awarded numerous national and international awards (e.g., the Glenn Seaborg medal) and am a recognized expert in nuclear particle detection along with expertise in theoretical physics. My current CV is attached.
4. I have been a co-author of Rusi P. Taleyarkhan ("Taleyarkhan") for several publications over the years involving discoveries in sonofusion a/k/a bubble fusion. I have found Taleyarkhan's scholastic, academic, and research abilities to be excellent and would be happy to testify further regarding the same.
5. With regard to the Multiphase Science & Technology ("MST") paper of 2005 for which I was acknowledged by Taleyarkhan, contributions were made from several collaborators (also acknowledged) including me. This MST paper was in line with conventional practice for broad-brush overview manuscripts. Since this manuscript was focused on multi-phase science readership, not including myself and several other collaborators as co-authors was reasonable.

The contributions included that from Xu et al. (whose NED manuscript was not published at the time).

6. Use of figures (previously published in our own other publications) was done uniformly for all MST manuscripts in the specific special series of the journal.

7. I am aware that a letter of clarification specifically citing the source for each figure and also directly citing the Xu et al. NED manuscript for Fig. 8b has been transmitted to the Editor-in-Chief in December 2007. This demonstrates responsiveness on the part of the authors involved (including Taleyarkhan). There does not appear to be any intent to mislead anyone, much less the readership of MST.

8. I believe it is ridiculous to charge plagiarism by the authors. If anything, honest oversights or omissions occurred which were addressed by the authors when a concern was voiced and made known to me by Taleyarkhan.

9. Offering Review Comments and Assistance for Publication of Xu et al. work I am familiar with the process used and the events that lead up to the publication of the Xu et al. NED manuscript and the Xu et al. NURETH -11 manuscript generally from reports I have received from Taleyarkhan and from the press.

10. I see nothing wrong in offering review comments, and advice on where to submit a manuscript for publication. Assuming that Taleyarkhan provided such comments and advice, he acted in accordance with scientific standards and did nothing wrong. This is common practice worldwide. I do not believe this activity could or should ever be considered research misconduct.

11. Furthermore, I see nothing wrong with offering guidance and feedback to junior colleagues when solicited, here by Xu, and provided, here by Taleyarkhan, on responding to

comments from journal referees as long as there was no influence on the technical content being presented.

12. Authorship vs Acknowledgment I maintain that helping to write/compose a manuscript does not qualify for co-authorship for scientific journals. Co-authorship requires substantive technical input and/or direct participation in the experimental set up, conduct, data acquisition, data processing, data analyses and drawing of conclusions for the specific work being prepared for dissemination to the world. Co-authorship is by invitation from the lead author and it is the right of the invitee to accept or decline. Acceptance for co-authorship is a voluntary function and has to be declared in writing to the publisher. Acceptance for co-authorship can depend on circumstances (*e.g.*, if a participant belongs to an organization which does not wish to be revealed, as can happen in cases of national security).

13. Sound scholarship dictates a duty as a professional in the field to offer time and advice for reviewing manuscripts when requested by colleagues, both junior and senior. It is not uncommon for reviewers or referees to significantly mark up a manuscript (especially when written by fellow scientists from foreign countries where English is not the native language). Markups also at times include extensive and independent evaluation and analyses of data by the reviewers; if errors are found they are pointed out and revised estimates are provided for the author's consideration. The original manuscript authors can acknowledge such assistance, guidance and counsel but in no case is it mandatory. Furthermore, such assistance certainly does not require co-authorship.

14. I must also be understood that it is common practice for manuscripts to be written (to varying degrees) by professional technical writers or by thesis advisors providing markups and modifications. Our 2002 *Science* manuscript co-authored by Taleyarkhan, me, and others,

was first drafted by ORNL's technical writers and also modified by the *Science* magazine editorial staff. Participation in composing the language of a manuscript for publication in journals does not meet the standard for co-authorship.

15. I did not participate in the reported sonofusion experiments conducted by Xu et al. (NED 2005 nor NURETH-11 paper). I do not personally know of anyone from the original team (*Science*, 2002; PRE 2004) that directly participated in the conduct of experiments or acquisition of data of the reported Xu et al. studies.

16. Based on published materials I have reviewed (e.g., Purdue's own July 2005 Press Release, etc.), Xu has testified that neither Taleyarkhan or I played any role in the published Xu et al. experiments, nor influenced the data or conclusions.

17. I feel that Taleyarkhan and JaeSeon Cho ("Cho") are appropriately acknowledged in the Xu et al. NED manuscript. Neither Richard T. Lahey, Colin West, Taleyarkhan, Cho or I provided the type of input that would rise to the level of co-authorship, nor would it be appropriate to do so.

18. The technical material provided in the NED and NURETH-11 manuscripts by Xu et al. represents a presentation of experimental results aimed at confirming previous observations. No one from the original Taleyarkhan et al. team (*Science*, 2002) contributed to this material. Therefore, co-authorship by Taleyarkhan, et al.'s team (*Science*, 2002) would be wrong.

19. I have spoken at length with E. Forringer ("Forringer") of LeTourneau University in relation to his reported manuscripts (co-authored by Forringer and his students) that were presented at two international conferences during November 2006. Forringer appropriately acknowledged the assistance provided by Taleyarkhan and Xu. The fact that Taleyarkhan and

Xu offered assistance in conducting experiments which were under the independent control of Forringer for data gathering, analyses and conclusions has been confirmed by Forringer to me. The manuscripts and presentation by Forringer during November 2006 are similar in nature to the works of Xu et al. in relation to their 2005 NED publication.

20. Standards of co-authorship and acknowledgment are not cast in stone. The 2006 manuscripts published by the groups of Seth Putterman ("Putterman") and Lefteri Tsoukalas ("Tsoukalas") both failed to include Taleyarkhan for his assistance similar to that offered to Xu et al., and did not even acknowledge Taleyarkhan et al. for their technical assistance. This is disturbing since these individuals have publicly alleged wrongdoing by Taleyarkhan et al. for the similar assistance provided by Taleyarkhan and Cho to Xu et al. Any such charges by detractor groups like Putterman et al. and Tsoukalas et al. (as appear to have been made in the 2007 statements to the US Congress) are, therefore, highly suspect and should be dismissed.

21. Statement on independence made in 1/06 PRL manuscript The only statement made in the joint 1/2006 PRL manuscript (listing me and Xu as co-authors with others) was "These observations have now been independently confirmed." This was considered appropriate for the following reasons:

- Compared with what we (Taleyarkhan, me, et al.) did at ORNL, Xu et al. performed their experiments in a totally different experimental configuration, the experiments were performed at a different laboratory in a different state and institution, used a radically different method for nucleation (viz., Xu et al., used randomly emitted neutrons of various energies from an isotope source versus the use of a microsecond duration pulse of monoenergetic neutrons from an accelerator at ORNL), used different test cells, used different detection systems, performed their own calibrations, obtained their own data, and derived their own "observations" without the participation of nor influence from any one of the original Taleyarkhan, et al. team. Therefore, the use of the stated language is appropriate.

- The Xu et al. NED (2005) manuscript was already published and Purdue's own Press Release of 7/2005 mentions the levels of participation by various entities involved.
- None of the co-authors (including Xu himself) nor the referees nor editorial staff of PRL saw anything wrong with nor challenged the statement on independent observations as documented. It was written, reviewed and agreed upon in a forthright manner.

22. Acknowledgment of sponsorship. Acknowledgment of sponsors by Taleyarkhan and me for our 1/2006 PRL publication was done in line with expectations. It has been publicly alleged that DARPA should have been acknowledged, but I believe this allegation has no merit. To my knowledge DARPA funding was not available during 2003 to mid-2005 when these experiments reported in 1/2006 PRL were conducted. Several co-authors, including me, worked with Taleyarkhan at their own expense to further the science and to answer the last remaining technical question from detractors (viz., to be able to produce evidence of D-D fusion neutrons without use of external source of neutrons). It is common practice at universities in the USA for faculty to use part of their time to pursue scholarly work when they can accommodate it given their normal routine duties. From email correspondence given me by Taleyarkhan (*i.e.*, an email correspondence from the USDoe's Office of Security and also the funding documentation from DoE's BWXT-Y12, the gap in funding from DARPA was filled by DoE specifically for deriving the technology of this work (and federal funding from DoE was not recognized by Taleyarkhan with DoE's permission – based on email evidence provided by Taleyarkhan).

23. Taleyarkhan has provided details of work that Taleyarkhan et al. performed at Purdue with the newly obtained funds from DARPA (via UCLA) during mid-2005 to February 2006. The tabulated list of tasks (provided to me for review) as conducted by Taleyarkhan et al. and the (~\$180K) funds utilized at Purdue for that purpose (as was stated in the July, 2006 Nature article) are reasonable. The work for the DARPA-UCLA project was identical to what

our group had already published in 2002 (*Science*). For one knowledgeable in the field, this is radically different from that conducted for the 1/2006 PRL studies for which our first draft was already being prepared for transmittal to journals by the time the DARPA-UCLA funds were put in place in mid-2005.

24. It would be inappropriate to include acknowledgment of DARPA for supporting the research leading to the 1/2006 PRL publication, when in fact it was sponsored from other sources (DoE, internal university, and even personal effort). It is unusual, to say the least, that DARPA itself has not voiced concern but our well-known detractors are doing so openly in the press. Brian Josephson described this properly as "Putterman's Flawed Case."

25. G60 Data on sonofusion. During mid-2007, I first heard of science related questions for sonofusion data taken for deuterated benzene-based mixtures taken on 9.19.03 at Purdue's G60 laboratory. Taleyarkhan had asked for me to provide advice and review of data taken for neutron gamma emissions using liquid scintillation detector with pulse-shape discrimination. The G60 data obtained at Purdue on 9.19.03 for neutron-gamma emissions during bubble fusion experiments with deuterated benzene mixtures (nucleated with an external Pu-Be neutron source) are in line with expectations upon consideration of interference from the electronic components present in the laboratory at the time. Such interference issues cancel themselves when subtracting data taken with cavitation on from cavitation off conditions. The difference data are in line with expectations of D-D fusion neutron emission (*i.e.*, I have co-authored a detailed response to Purdue (August 2007) with Taleyarkhan on this subject and I stand by the statements made therein). Also, I do not subscribe to the possibility of improper BNC cable termination to result in ringing as having caused the two peaks of counts (precisely in the gamma and neutron windows in the expected D-D fusion emission signature). If it were the

case, the ringing would remain for cavitation on as well as cavitation off conditions and thus, cancel itself.

26. I consulted with Taleyarkhan et al. for the set up of LS detector data acquisition trains involving [well-established techniques and state-of-the-art components] from reputable suppliers such as Ortec and Canberra. Indeed, I tutored Taleyarkhan and his team at ORNL and set up the detector system trains which produced the data presented in the group's various manuscripts. It is my understanding (per discussions with Taleyarkhan) that a similar train was used in the G60 laboratory. Therefore, Taleyarkhan and Cho used techniques for detection that are well-accepted in the field, with the notable exception of other electronic drive components such as amplifiers and inductor coils, etc. which evidently led to broader than expected spectra for neutron-gamma light pulse decay times. Such a spreading effect was also noted in the experiments of Seth Putterman et al. (PRL, 2007). However, any such baseline effects can be reasonably expected to cancel out upon subtraction of nuclear particle signal detection between cavitation on and off conditions at the same drive power level. The difference spectra (time decay of light pulses from neutron and gamma photon interactions with NE-213 molecules) clearly indicate that the neutron and gamma peaks are in the expected regions and well separated. The neutron counts are several times that of the gamma counts as would be expected from D-D fusion neutron emission. Furthermore, the difference in pulse-height spectra also show that the neutron energies are largely below 2.5 MeV (once again, as would be expected from D-D fusion).

27. The fact that archived date-time stamped data files from the MCA (a process which uses proprietary software) [from highly reputable companies such as Ortec, Canberra, and



Spectrum Techniques] is the necessary and sufficient evidence for proving that the data were obtained on 9/19/03 itself, and simply could not have been fabricated.

28. The specific data of 9/19/03 are not pertinent for publication without conduct of control experiments with non-deuterated liquids. From what I am informed, such experiments were not conducted. Hence, the decision by Taleyarkhan et al. to not offer the scoping test data of 9.19.03 taken with deuterated benzene based mixtures is reasonable. Also, it is the prerogative of the persons obtaining the data to decide if and when to publish their works.

29. The above mentioned issues highlighted in the Press have no merit. These seem to be desperate attempts by competitors and detractors alike to derail bubble fusion.

30. I have known Taleyarkhan since 1977, ever since he joined RPI as a graduate student. I have interacted with Taleyarkhan as a professor and mentor and as a colleague for close to 30 years. I can vouch for Taleyarkhan's integrity and resolve.

31. In fact, I have stated before to Purdue when allegations of research misconduct first arose, that these allegations are baseless. See my letter to Press and Purdue University President, attached.

32. I have collaborated closely with Taleyarkhan to prepare and transmit our 10/2006 Response to the baseless allegation related to the usage of Cf-252. The Response was prepared to remain compatible with the Comment from Naranjo himself in terms of scaling and bias. There was no intent to mislead anyone and the possible inclusion of our bubble fusion data for channels below which no comparable Cf-252 related data were present during acquisition is reasonable and within the prerogative of the authors. Including the bubble fusion data for channels below #10 (at which point Naranjo stopped for comparison against Cf-252 neutron

emission signals) would only provide additional data for one set without a comparable set of data from the newly obtained Cf-252 neutron data and as such would have confused the situation.

33. In my opinion, Taleyarkhan should not be subjected to the subjective, esoteric details of an investigation concerning research misconduct. His character, his resolve, makes it impossible for him to commit research misconduct.

---

DR. ROBERT C. BLOCK

SUBSCRIBED AND SWORN TO  
before me this \_\_\_\_\_ day  
of \_\_\_\_\_, 2008.

---

Notary Public

Confidential: Not to be distributed or discussed with anyone pursuant to Purdue University confidentiality rules.

emission signals) would only provide additional data for one set without a comparable set of data from the newly obtained Cf-252 neutron data and as such would have confused the situation.

33. In my opinion, Taleyarkhan should not be subjected to the subjective, esoteric details of an investigation concerning research misconduct. His character, his resolve, makes it impossible for him to commit research misconduct.

  
DR. ROBERT C. BLOCK

SUBSCRIBED AND SWORN TO  
before me this \_\_\_\_\_ day  
of \_\_\_\_\_, 2008.

\_\_\_\_\_  
Notary Public