

Research Ethics

Prashant V. Kamat



Based on the lectures of

Leonard V. Interrante

Editor-in-chief, Chemistry of Materials

Presented at in the Symposium on Scientific Publishing,
ACS National Meeting, Atlanta, GA March 2006

On Being a Scientist: Third Edition

Committee on Science, Engineering, and Public Policy,
National Academy of Sciences, National Academy of
Engineering, and Institute of Medicine

<http://www.nap.edu/catalog/12192.html>

Where do students learn ethical decision making?

1. Mentor, advisor
2. Fellow graduate students
3. Family
4. Friends not in graduate school
5. Other faculty
6. Religious beliefs
7. Discussions in courses, labs, seminars
8. Professional organizations
9. Courses dealing with ethical issues



Setting off on the road to the responsible conduct of research

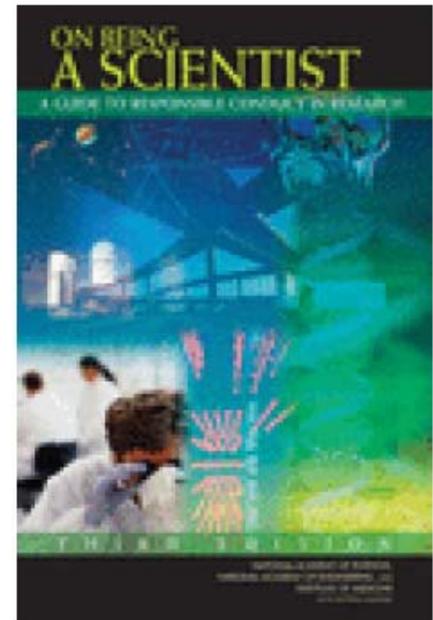
(From ORI

http://ori.dhhs.gov/education/products/RCR_intro/c02/0c2.html)

- J. P. Swazey, K. S. Louis, and M. S. Anderson, "The ethical training of graduate students requires serious and continuing attention," *Chronicle of Higher Education* 9 (March 1994):B1-2; J. P. Swazey, "Ethical problems in academic research," *American Scientist* 81(Nov./Dec. 1993):542-53.

Three sets of obligations of a researchers to adhere to professional standards.

1. An obligation to honor the trust that their colleagues place in them.
2. An obligation to themselves. Irresponsible conduct in research can make it impossible to achieve a goal.
3. An obligation to act in ways that serve the public.



[On Being Scientist](http://www.nap.edu/catalog/12192.html)

<http://www.nap.edu/catalog/12192.html>

Available free for one download

Research Ethics

Part I. Sharing Scientific Knowledge

- Research publication
- Authorship and collaborative Research
- Scientific Misconduct –FFP & QRP
- Examples of scientific misconduct in literature

Part II Laboratory Practice and COI

- Practices of Image and Data Manipulation
- Data Ownership & Intellectual Property Guidelines
- Conflict of Interest & Commitment
- Govt. vs. Industry Sponsored Research
- Sharing the data in thesis



(From ORI
<http://ori.dhhs.gov/education/products/RCRintro/c02/0c2.html>)

Scientific Knowledge

The object of research is to extend human knowledge beyond what is already known.

But an individual's knowledge enters the domain of science only after it is presented to others in such a fashion that they can independently judge its validity

(NAP, "On Being a Scientist" 1995)

Sharing Scientific Knowledge

“Science is a shared knowledge based on a common understanding of some aspect of the physical or social world”

(NAP, “On Being a Scientist” 1995)

Presentations

- Social conventions play an important role in establishing the reliability of scientific knowledge

Publications in peer reviewed journals

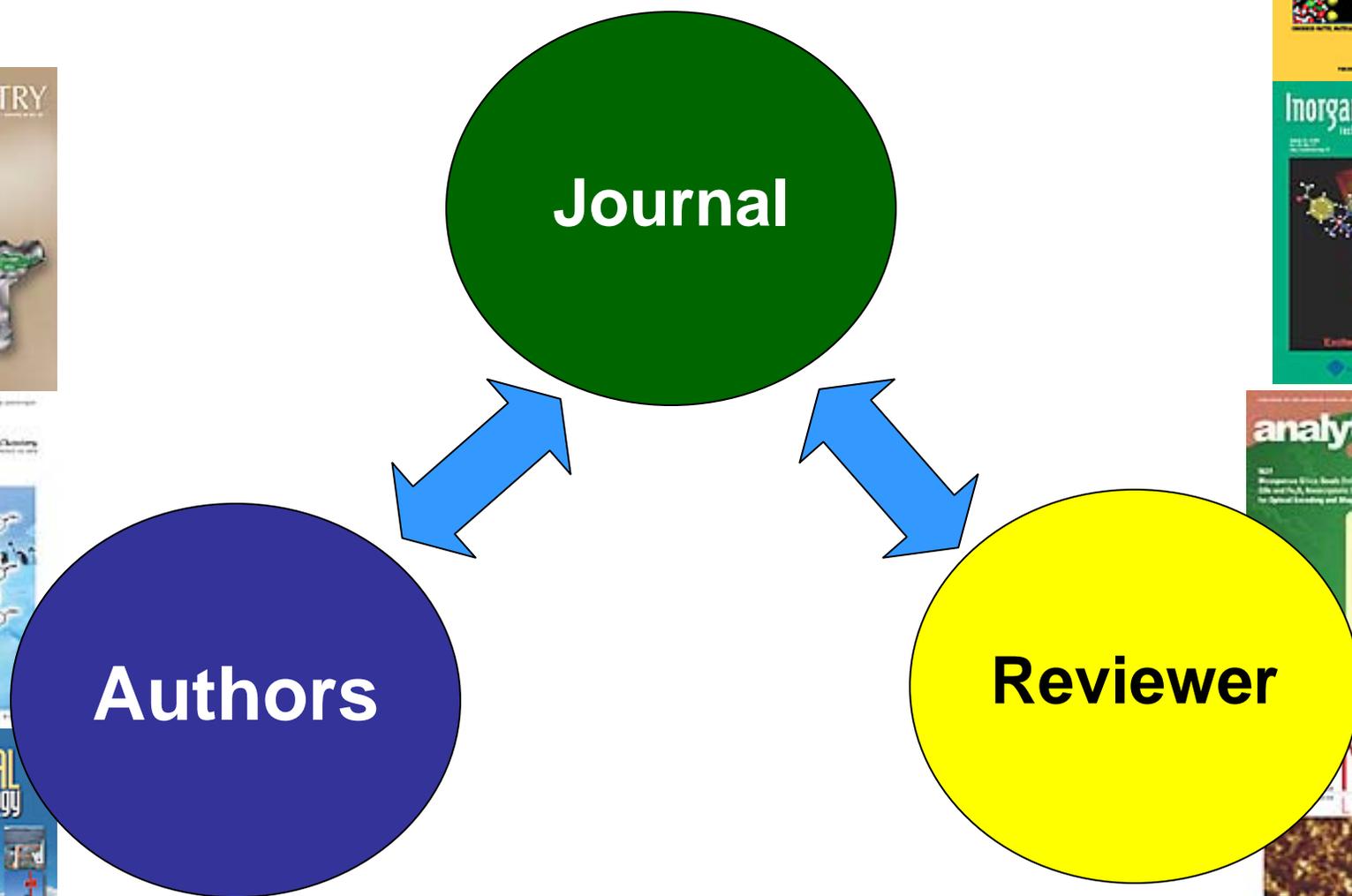
- Research results are privileged until they are published

Thesis

Why Publish?

- **“A paper is an organized description of hypotheses, data and conclusions, intended to instruct the reader. If your research does not generate papers, it might just as well not have been done”** (G. Whitesides, Adv. Mater., 2004, 16, 1375)
- **“if it wasn’t published, it wasn’t done”** - in E.H. Miller 1993

Scientific Publication is a Team Effort



ACS Journals: <http://pubs.acs.org/about.html>

Authorship

- The list of authors establishes accountability as well as credit.
- Policies at most scientific journals state that a person should be listed as the author of a **paper only if that person made a direct and substantial intellectual contribution** to the design of the research, the interpretation of the data, or the drafting of the paper.
- The acknowledgments section can be used to thank those who indirectly contributed to the work.

Including “honorary,” “guest,” or “gift” authors dilutes the credit due the people who actually did the work, inflates the credentials of the added authors, and makes the proper attribution of credit more difficult.

(“On Being a Scientist” , NAP)



(From ORI
<http://ori.dhhs.gov/education/products/RCR/intro/c02/0c2.html>)

Author Responsibilities

– Preparation and Submission of Manuscripts:

Follow General Rules:

- Ensure work is new and original research
- All Authors are aware of submission and agree with content and support submission
- Agree that the manuscript can be examined by anonymous reviewers.
- Provide copies of related work submitted or published elsewhere
- Obtain copyright permission if figures/tables need to be reproduced
- Include proper affiliation

What is publishable....

Journals like to publish papers that are going to be widely read and useful to the readers

- Papers that report “**original and significant**” findings that are likely to be of interest to a broad spectrum of its readers
- Papers that are **well organized and well written**, with clear statements regarding how the findings relate to and advance the understanding/development of the subject
- Papers that are **concise and yet complete** in their presentation of the findings

What is not acceptable...

- Papers that are **routine extensions of previous reports** and that do not appreciably advance fundamental understanding or knowledge in the area
- **Incremental / fragmentary reports** of research results
- **Verbose, poorly organized, papers** cluttered with unnecessary or poor quality illustrations
- **Violations of ethical guidelines**, including plagiarism of any type or degree (of others or of oneself) and questionable research practices (QRP)

Research Misconduct

Research misconduct means **Fabrication, Falsification, or Plagiarism (FFP)** 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.
- (d) Research misconduct does not include honest error or differences of opinion.

Definitions:

Plagiarism and Self-Plagiarism

- **Plagiarism**: using the ideas or words of another person without giving appropriate credit (Nat. Acad. Press document)
- **Self-Plagiarism**: The verbatim copying or reuse of one's own research (IEEE Policy statement)

Both types of plagiarism are considered to be unacceptable practice in scientific literature

ACS Publication Policy

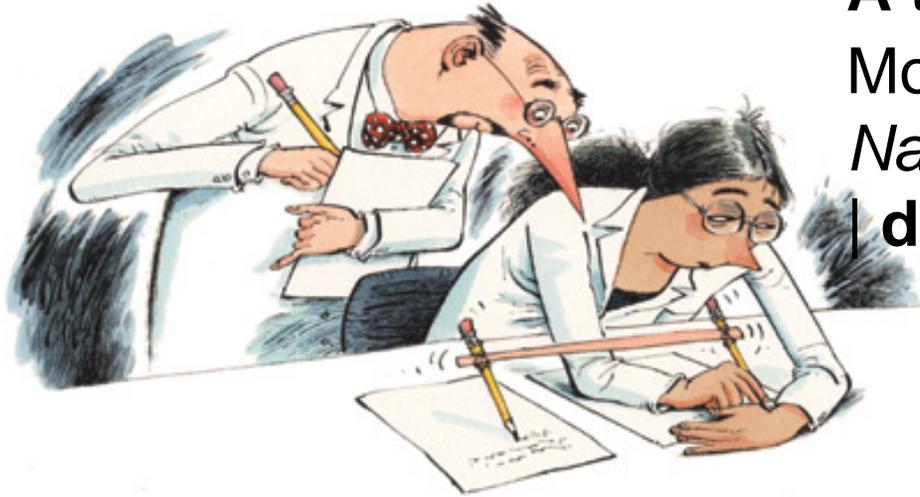
Plagiarism statement for Ethical Guidelines

January 2009

B. 9. It is the responsibility of the author to ensure that the submitted manuscript is original and shall not contain plagiarized material. **Plagiarism is passing off another person's work as one's own, i.e., reusing text, results, or creative expression without explicitly acknowledging or referencing the original author or publication.**

Authors should be aware this includes **self-plagiarism, defined as the reuse of significant portions of the author's own published work or works, without attribution to the original source.** Examples of plagiarism include verbatim copying of published articles; verbatim copying of elements of published articles (e.g., figures, illustrations, tables); verbatim copying of elements of published articles with crediting, but not clearly differentiating original work from previously published work; and self-plagiarism.

It is the **responsibility of the author to obtain proper permission** and to appropriately cite or quote the material not original to the author. In this context, "quote" is defined as reusing other works with proper acknowledgement. Appropriate citation applies whether the material was written by another author or the author him or herself.



A tale of two citations

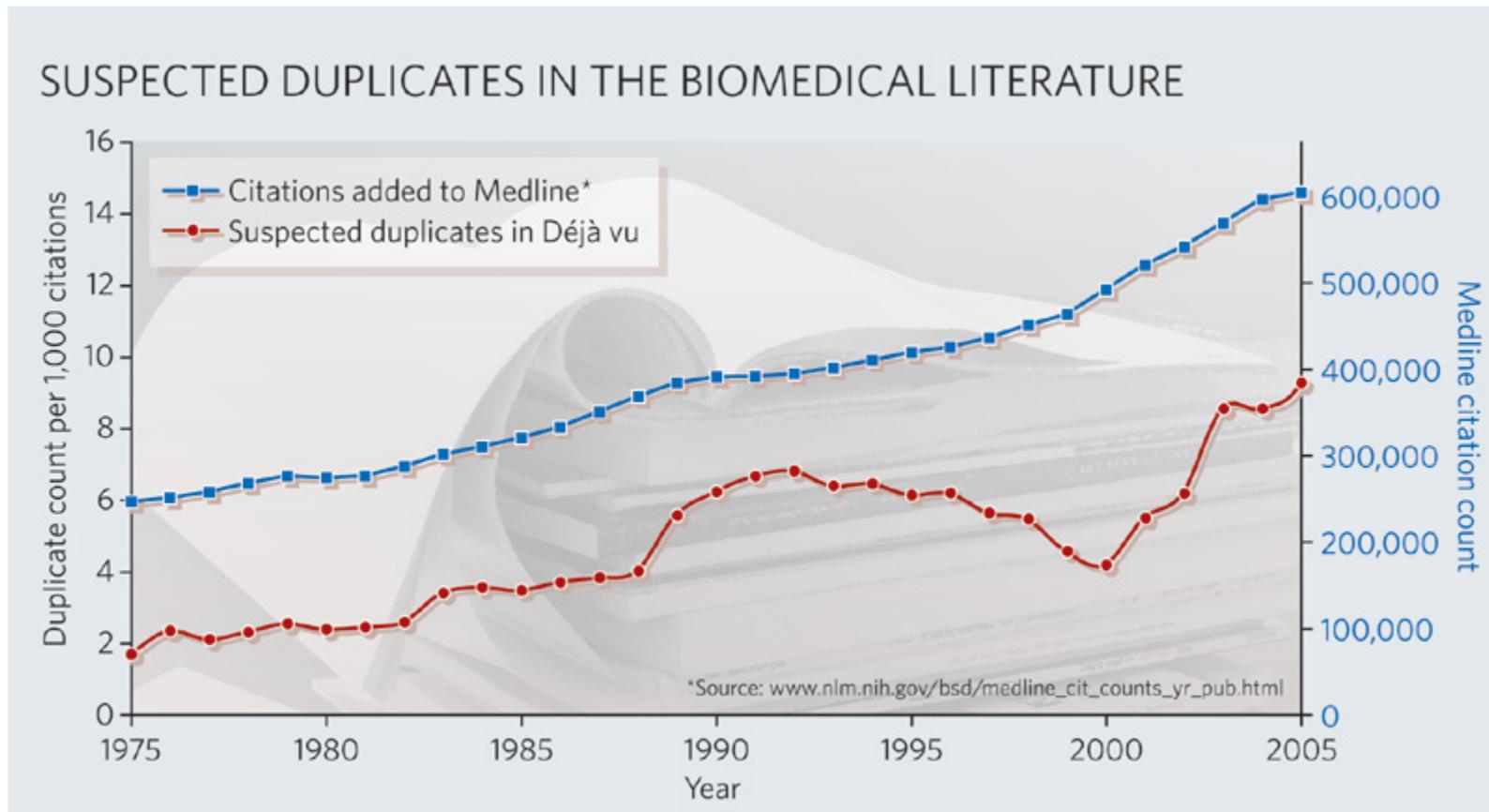
Mounir Errami & Harold Garner
Nature **451**, 397-399 (24 Jan 2008)
| **doi:10.1038/451397a**

"It is the best of times, it is the worst of times". Scientific productivity, as measured by scholarly publication rates, is at an all-time high. However, high-profile cases of scientific misconduct remind us that not all those publications are to be trusted — but how many and which papers?

The most unethical practices involve substantial reproduction of another study (bringing no novelty to the scientific community) without proper acknowledgement. If such duplicates have different authors, then they may be guilty of plagiarism, whereas papers with overlapping authors may represent self-plagiarism.

Simultaneous submission of duplicate articles by the same authors to different journals also violates journal policies.

Mounir Errami & Harold Garner
Nature **451**, 397-399 (24 Jan 2008)



China and Japan, have estimated duplication rates that are roughly twice that expected for the number of publications they contribute to Medline. Perhaps the complexity of translation between different scripts, differences in ethics training and cultural norms contribute to elevated duplication rates in these two countries.

Other Types of Ethical Violations

- Duplicate publication/submission of research findings; failure to inform the editor of related papers that the author has under consideration or “in press”
- Unrevealed conflicts of interest that could affect the interpretation of the findings
- Misrepresentation of research findings - use of selective or fraudulent data to support a hypothesis or claim

Data Manipulation

- Researchers who manipulate their data in ways that deceive others are violating both the basic values and widely accepted professional standards of science. - failure to fulfill all three obligations.
- They mislead their colleagues and potentially impede progress in their field or research.
- They undermine their own authority and trustworthiness as researchers.



(From ORI
<http://ori.dhhs.gov/education/products/RCRintro/c02/0c2.html>)

Misleading data can also arise from poor experimental design or careless measurements as well as from improper manipulation.

When a mistake appears in a journal article or book, it should be corrected in a note, erratum (for a production error), or Additions/Corrections

Sooner or later

..... ethical violations get exposed

Some recent examples

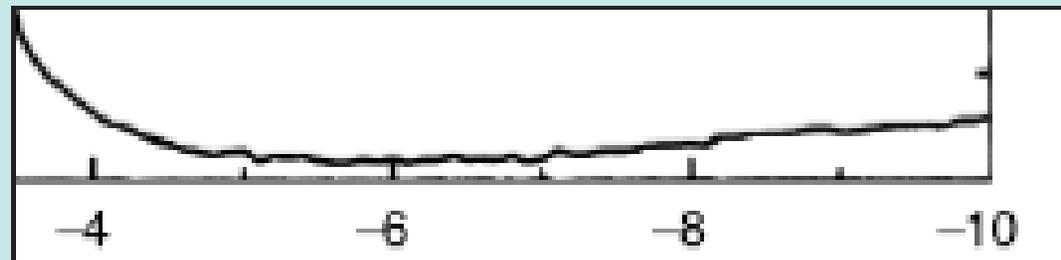
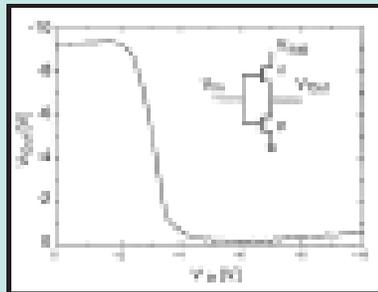
Pioneering Physics Papers Under Suspicion for Data Manipulation

Recent discoveries at Bell Laboratories—the research arm of Lucent Technologies in Murray Hill, New Jersey—said to be of Nobel quality suddenly became mired in questions last week. Outside researchers presented evidence to Bell Labs management on 10 May suggesting possible manipulation of data involving five papers published in *Science*, *Nature*, and *Applied Physics Letters* over 2 years. In response, Bell Labs officials said that they are forming a committee of independent researchers to investigate. Their conclusions may not be known for months, but scientists who have seen the data are already saying that the potential fallout from the investigation could be devastating.

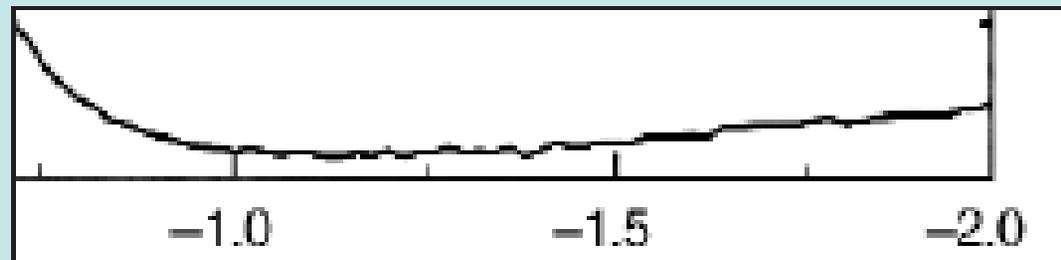
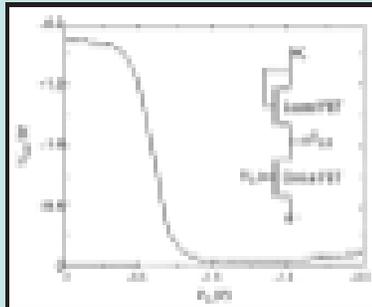
The Bell Labs papers describe a series of different experiments with organic conduc-

Angeles, and director of the California NanoSystems Institute: “It’s hard to understand. I know these people. Most of them are good, careful scientists.” “It’s a little overwhelming,” adds Lydia Sohn, a Princeton University physicist who helped bring some of the discrepancies to light. “It’s just disturbing, and disappointing, and sad.” The noise pattern is particularly disturbing, says Charles Lieber, a chemist and nanoscience expert at Harvard University in Cambridge, Massachusetts: “It’s virtually impossible for me to believe that some of this wasn’t made up.”

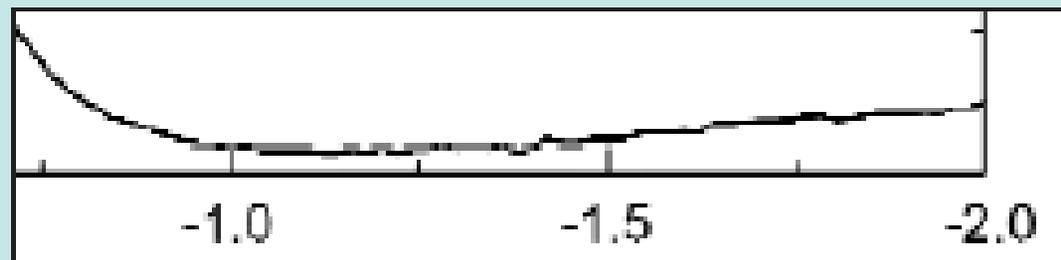
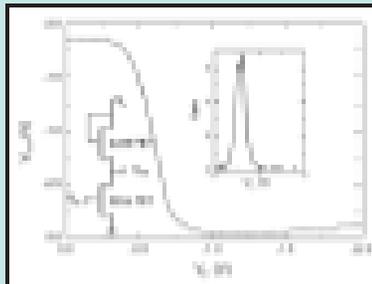
Schön himself acknowledges that the similar noise pattern is “difficult to explain.” But others affiliated with Bell Labs suggest privately that a systematic artifact in the measurement equipment might account for



Science 287, 1022 (11 February 2000)



Nature 413, 713 (18 October 2001)



Science 294, 2138 (7 December 2001)

Striking resemblance. Published data from studies of different devices revealed a similarity in recorded "noise." Schön says the bottom figure was sent to *Science* by mistake (see correction, p. 1400).

Retraction

WE WISH TO RETRACT OUR REPORT “*CDX2* GENE EXPRESSION AND TROPHECTODERM LINEAGE specification in mouse embryos” (1). Allegations of research misconduct were received by the University of Missouri-Columbia (MU) Provost, and an investigation found that the first author (K.D.) engaged in research misconduct by intentionally falsifying and fabricating digital images in the preparation of Figs. 4I; 4N; 4S; 2G; 3, J to L; S2, V to X; and S6, I to K accompanying the *Science* article. In addition, the original raw image files for the majority of the figures in the paper have not been located (the exceptions being the confocal scanning images in Figs. S1, S3, S4, S5, and S6), raising the possibility that the data they represent may also be suspect. We have decided to withdraw the article in its entirety in view of the fact that the paper was founded at least in part on falsified or fabricated images.

The corresponding author (R.M.R.) takes responsibility for placing excessive trust in his co-worker and for not assuring that a complete set of raw data existed at the time the questions first arose about the paper. We deeply regret any scientific misconceptions that have resulted from the publication of this article.

The first author resigned from MU shortly after the allegations of research misconduct were received and could not be found to sign the retraction.

R. MICHAEL ROBERTS,¹ M. SIVAGURU,² H. Y. YONG³

¹Division of Animal Sciences, University of Missouri, Columbia, MO 65211, USA. ²Institute for Genomic Biology, University of Illinois, Urbana-Champaign, IL 61801, USA. ³BK21 Dental Research Institute, College of Dentistry, Seoul National University, 28 Yongun-dong, Chongno-gu, Seoul 110-749, Korea.

Reference

1. K. Deb, M. Sivaguru, H. Y. Yong, R. M. Roberts, *Science* **311**, 992 (2006).

Citations

- Read the work before you cite
- Important to cite the work correctly and completely

Paper trail reveals references go unread by citing authors

Philip Ball

Many of the references cited in scientific papers have not been read by the authors citing them, according to an analysis of how errors in citations propagate through the literature.

It isn't easy to establish directly — and truthfully — whether citations have been

reference being copied from someone else's citation list. The most common misprint appeared 78 times.

Based on the number of distinct misprints, the two researchers estimate that only 22–23% of citations followed from a reading of the original paper. And they postulate that this is typical of the scientific literature as a whole.

The Chronicle of Higher Education, August 11, 2006
Also in Wall Street Journal –today's issue
(40% students use materials downloaded from internet!)

The Plagiarism Hunter

When one graduate student went to the library, he found copycats — lots of them By PAULA WASLEY, Athens, Ohio

In Ohio University's Library, Thomas A. Matrka takes just 15 minutes to hit pay dirt. Scattered before him on a table are 16 chemical-engineering master's theses on "multiphase flow." Identical diagrams in two theses from 1997 and 1998 strike him as suspicious. Turning a few more pages, he confirms what he suspected.....

Most of the plagiarism found at Ohio occurred in introductory chapters describing research methods and reviewing the previous literature in the field, for which there is little expectation of originality. And all but a few cases involved international students who, he says, **whether through ignorance, laziness, or cultural misunderstanding, may have either not known correct citation practices or, struggling to write** in a foreign language, been tempted to borrow another student's words.

How Journals Detect and Handle Problem Papers

- Information received from reviewers or other editors
- Literature search for related papers by the author
- ❖ Withdrawal of a paper from publication
- ❖ Banning authors from publication in the journal for 3-5 years and informing the co-authors and editors of related journals of our action
- ❖ For less serious cases, placing the author on a “watch list” for careful examination of their submissions prior to requesting reviews

A recent retraction

Ethical Responsibilities for Authors in *The Journal of Physical Chemistry*

I recently took the step of retracting from the scientific record a letter published in *The Journal of Physical Chemistry C*, as it is emblematic of a type of author misconduct that we as research professionals must seek to avoid if we are to uphold the integrity of the scientific literature.

The letter in question was a publication by Fang et al., *J. Phys. Chem. C* **2007**, *111*, 1065-1070. After publication of the letter, it was brought to our attention that the paper by Fang et al., as submitted and subsequently published by the journal after peer review, included a number of figures that duplicated those contained within previously published papers by other authors, I judged such misconduct by the authors to constitute a serious instance of plagiarism.

George Schatz
Editor in Chief
J. Phys. Chem. A/B/C

Original Paper
Oriented Assembly of Fe₃O₄
Nanoparticles into Monodisperse
Hollow Single-Crystal Microspheres
Yu et al, *J. Phys. Chem. B* 2006,
110, 21667-21671 (Figure 3)

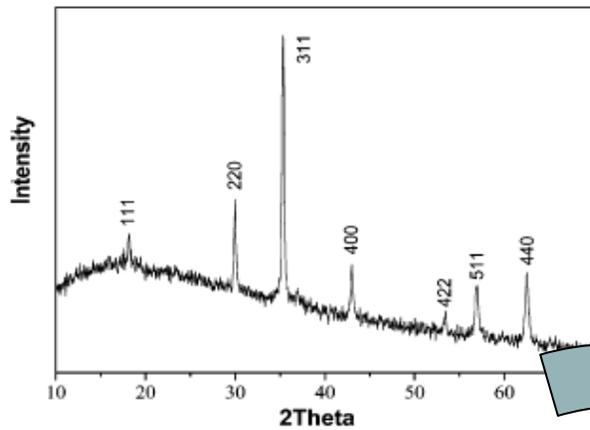
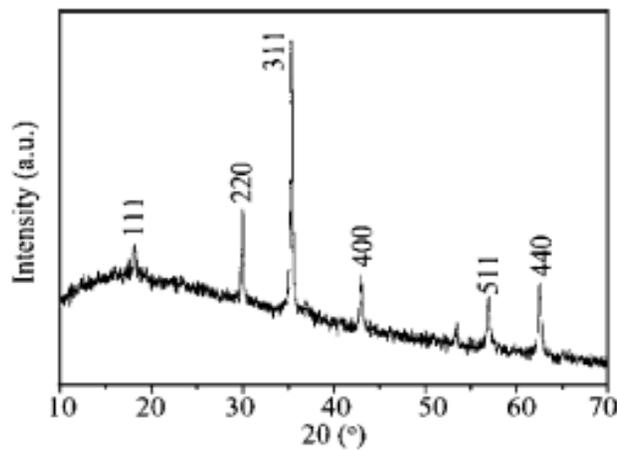


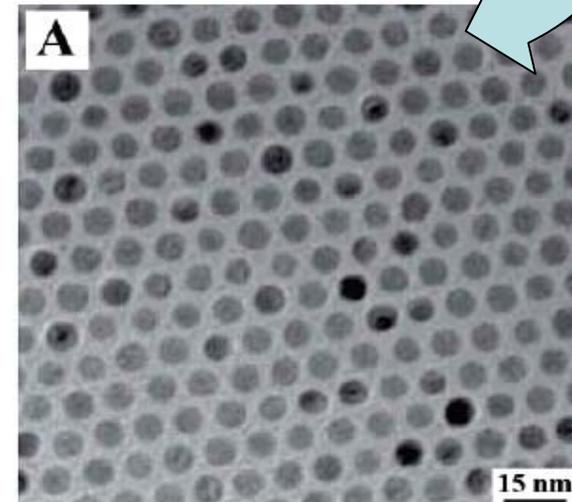
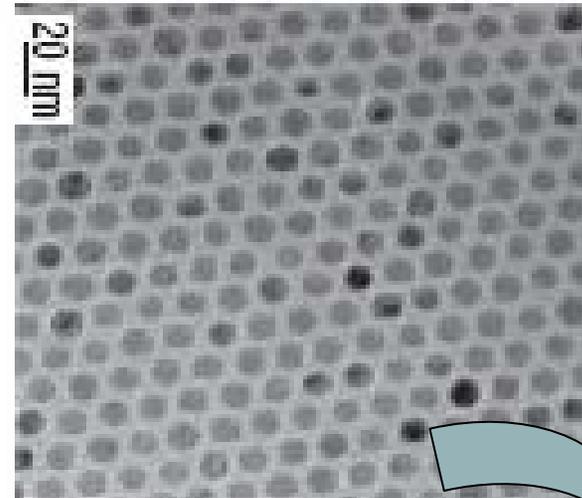
Figure 3. A typical XRD pattern of Fe₃O₄ hollow microspheres.



Plagiarized paper:

Fabrication of Monodisperse Magnetic
Fe₃O₄-SiO₂ Nanocomposites with
Core-Shell Structures Hua Fang,*
Chun-yang Ma, Tai-li Wan, Mei Zhang,
and Wei-hai Shi *J. Phys. Chem C*
2007, 111, 1065-1070

Original paper:
Ultra-large-scale syntheses of monodisperse
nanocrystals, Park et al. *Nature Materials*,
2004, 3, 891 (Figure 3C)



RETRACTED: Fluorescence lifetime increase by introduction of F⁻ ions in ytterbium-doped TeO₂-based glasses

Journal of Alloys and Compounds, Volume 393, Issues 1-2, 3 May 2005, Pages 279-282

Guonian Wang, Shixun Dai, Junjie Zhang, Shiqing Xu and Zhonghong Jiang

RETRACTED: Effect of F⁻ ions on spectroscopic properties of Yb³⁺-doped zinc-tellurite glasses •

Journal of Physics and Chemistry of Solids, Volume 66, Issue 6, June 2005, Pages 1107-1111

Guonian Wang, Junjie Zhang, Shixun Dai, Jianhu Yang and Zhonghong Jiang

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1. **RETRACTED: Dependence of the structural and optical properties of ZnO thin films on the substrate temperature in atomic layer deposition and post-annealing**
Journal of Alloys and Compounds, Volume 449, Issues 1-2, 31 January 2008, Pages 371-374
 Jongmin Lim, Chongmu Lee
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2. **RETRACTED: Evaluation of specific properties of glass and carbon/vinyl ester composites**
Composites Part B: Engineering, Volume 39, Issue 1, January 2008, Pages 27-35
 Gowthaman Swaminathan, Kunigal N. Shivakumar, Mathew Sharpe
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3. **RETRACTED: Formation of three types of ordered phases in InAlAs epilayers grown by metalorganic chemical vapor deposition**
Thin Solid Films, In Press, Uncorrected Proof, Available online 16 July 2007
 Dong Chan Kim, Bo Hyun Kong, Hyung Koun Cho, Sang Ouk Jun, Eundeok Sim, Won Suk Han, Sung Bum Bae
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4. **RETRACTED: Effect of strain and nonparabolicity on electronic properties of self-assembled CdTe quantum wires grown on ZnTe buffer layer**
Solid State Communications, In Press, Accepted Manuscript, Available online 13 July 2007
 J.H. You, J.H. Jung, J.T. Woo, T.W. Kim, K.H. Yoo, H.S. Lee, H.L. Park
[Preview](#) [PDF \(478 K\)](#) | [Related Articles](#)
5. **RETRACTED: On the effect of Cd doping for Ca in La₃CaBa₃Cu₇O_y superconducting cuprate**
Materials Science and Engineering: B, In Press, Uncorrected Proof, Available online 25 May 2007
 Elsayed Kandyel, Khaled M. Elsabawy
[Preview](#) [PDF \(660 K\)](#) | [Related Articles](#)
6. **RETRACTED: "Studies on Spray Deposited CdIn₂S₄ Thin Films"**
Materials Science and Engineering: B, In Press, Uncorrected Proof, Available online 25 May 2007
 R.R. Sawant, A.V. Kokate, K.Y. Rajpure, C.H. Bhosale
[Preview](#) [PDF \(872 K\)](#) | [Related Articles](#)
7. **Retracted: Stress ratio and fatigue damage map study of hot rolled 7020-T6 aluminum alloy**
Materials Science and Engineering: A, Volumes 454-455, 25 April 2007, Pages 552-557
 Ashish Thakur, R. Raman, S.N. Malhotra
[Preview](#) [PDF \(1051 K\)](#) | [Related Articles](#)
8. **RETRACTED: Synthesis, sinterability and ionic conductivity of nanocrystalline Sm-doped La₂Mo₂O₉ fast oxide-ion conductors via in situ polymerization**

Home » [Science & Technology](#) » [A Massive Case Of Fraud](#)

SCIENCE / TECHNOLOGY

FEBRUARY 18, 2008 | VOLUME 86, NUMBER 07 | PP. 37-38

A Massive Case Of Fraud

Journal editors are left reeling as publishers move to rid their archives of scientist's falsified research

[William G. Schulz](#)

A CHEMIST IN INDIA has been found guilty of plagiarizing and/or falsifying more than 70 research papers published in a wide variety of Western scientific journals between 2004 and 2007, according to documents from his university, copies of which were obtained by C&EN. Some journal editors left reeling by the incident say it is one of the most spectacular and outrageous cases of scientific fraud they have ever seen.

The culprit, sources say, is chemistry professor Pattium Chiranjeevi of [Sri Venkateswara University](#) in Tirupati, India. SVU conducted an investigation into Chiranjeevi's work after a journal editor presented evidence to university officials that the professor had plagiarized and possibly falsified several manuscript submissions. Chiranjeevi, who communicates through a wide variety of e-mail addresses, has not responded to multiple requests for comment by C&EN.

Chiranjeevi retains his teaching position at SVU, according to a university source who has requested anonymity. "He is a permanent employee of the university, and the administration cannot fire him easily," the source says. Instead, Chiranjeevi has been barred from research and research supervision and from holding any administrative post at the university.



Shutte

A CHEMIST IN INDIA has been found guilty of plagiarizing and/or falsifying more than 70 research papers published in a wide variety of Western scientific journals between 2004 and 2007, according to documents from his university, copies of which were obtained by C&EN. Some journal editors left reeling by the incident say it is one of the most spectacular and outrageous cases of scientific fraud they have ever seen.

Can Stem Cells Become Sperm Cells



Health
ABC News |

A Potential New Hope for Infertile Men

By RADHA CHITALE

ABC News Medical Unit

July 9, 2009



Professor Karim Nayernia, is seen at Newcastle University

Now, new research may provide a glimmer of hope that infertile men may one day be able to contribute to the gene pool.

"We have a system which enables us for the first time to produce human sperm from stem cells," said Dr. Karim Nayernia, a professor of stem cell biology at Newcastle University in the United Kingdom and the lead researcher on this study, published July 8 in the journal *Stem Cells and Development*.

"Studying sperm maturation is not accessible in vivo [in a body]. You cannot follow the system," Nayernia said. "Now we have a system to monitor the stages of male infertility."



July 28, 2009

Journal Editor Retracts Paper on Sperm Made From Stem Cells

The paper, published online by *Stem Cells and Development* on 8 July with **Karim Nayernia of Newcastle University in the United Kingdom** as the corresponding author, had already received some criticism from other experts; Dr Allan Pacey of the University of Sheffield in the United Kingdom, for example, was quoted by [The Independent](#) as saying: "As a sperm biologist of 20 years' experience, I am unconvinced from the data presented in this paper that the cells produced ... can be accurately called 'Spermatozoa.' "

The paper's problems soon got much worse. Graham Parker, editor-in-chief of *Stem Cells and Development*, told *ScienceInsider* that he received an email on 10 July from the editors of another journal, *Biology of Reproduction*, claiming that **two paragraphs from Nayernia paper's introduction were copied without attribution from a [2007 review article](#)** by Makoto Nagano of McGill University in Montreal, Canada, that was published in their journal.

Parker says Nayernia told him the offending text was inserted by a postdoctoral fellow. But Parker says the explanation he received was not consistent with an innocent mistake. "Once I had established that the suggested reason for the text's inclusion was not being substantiated I decided to retract the paper" on 21 July, Parker says.

What are the reasons for plagiarism?



© Marc Tyler Nobleman / mtrcartoons.com

<http://plagiarism-main.blogspot.com/>

<http://www.indiana.edu/~wts/pamphlets/plagiarism.shtml>

Responding to Possible Plagiarism

Documenting reactions from authors and journal editors to plagiarism may help others address the problem.

Tara C. Long,¹ Mounir Errami,² Angela C. George,¹ Zhaohui Sun,² Harold R. Garner^{1,2*}

212 pairs of articles with signs of potential plagiarism were chosen for this study

86.2% -similarity between an original article and its duplicate

73.1%. the average number of shared references

Only 47 (22.2%) duplicates cited the original article as a reference.

71.4% of the manuscript pairs shared at least one highly similar or identical table or figure.

42% also contained incorrect calculations, data inconsistencies, and reproduced or manipulated photographs.

....The increasing availability of scientific literature on the World Wide Web has proven to be a double-edged sword, allowing plagiarism to be more easily committed, while simultaneously enabling its simple detection through the use of automated software.

Responding to Possible Plagiarism

Documenting reactions from authors and journal editors to plagiarism may help others address the problem.

Tara C. Long,¹ Mounir Errami,² Angela C. George,¹ Zhaohui Sun,² Harold R. Garner^{1,2*}

The responses from duplicate authors were more varied;

- 28% denied any wrongdoing,
- 35% admitted to having borrowed previously published material
- 22% were from coauthors claiming no involvement in the writing of the manuscript.
- 17% claimed they were unaware that their names appeared on the article

93% of the original authors were not aware of the duplicate's existence.

The journal editors primarily confirmed receipt and addressed issues involving policies and potential actions.

Selected Responses from the authors

“There are probably only ‘x’ amount of word combinations that could lead to ‘y’ amount of statements. ... I have no idea why the pieces are similar, except that I am sure I do not have a good enough memory

“I was not involved in this article. I have no idea why my name is included.”

“This article was mainly done by a young fellow Dr. []. I made the corrections in text and completed the article Unfortunately Dr. [] has died in January this year, so we can't ask him for the reasons.....”

“I am not a native English speaker so I do have problems in expressing my ideas... You and other English language speakers are lucky from this point of view....”

“To be honest with you, I was not aware of the fact that I need to take prior permission of the authors of the original article. As such I am facing many difficulties and hardships in my personal life. ...”

The corresponding author has been my teacher (and a very good one at that) from whom I have learned many things. My respect for him was of the utmost level until I found that he had been plagiarizing papers from all over the world.....”

There are now dozens of commercial and free tools available for the detection of plagiarism.

Perhaps the most popular programs are iParadigm's "Ithenticate" (<http://ithenticate.com/>) and TurnItIn's originality checking (<http://turnitin.com/>), which recently partnered with CrossRef (<http://www.crossref.org/>) to create CrossCheck, a new service for verifying the originality of scholarly content.

However, the content searched by this program spans only a small sampling of journals indexed by MEDLINE.

PubMed and other searches which, by default, return more recent articles first, ensuring that a plagiarized article will always appear higher on a list of search results than its original counterpart. As a result, citations that would have otherwise gone to an original publication are instead diverted to a plagiarized one.

Good Record Keeping

It is your fundamental obligation to create and maintain an accurate, accessible, and permanent record of data.

Record sufficient detail for others to check and replicate the work.

Depending on the field, it will require entering data into bound notebooks with sequentially numbered pages using permanent ink, using a computer application with secure data entry fields, identifying when and where work was done, and retaining data for specified lengths of time.

Every scientific result must be carefully prepared, submitted to the peer review process, and scrutinized even after publication.

Useful Tips to Succeed in Graduate research

- BE SELFISH. You are working for your degree program.
- Set a weekly goal and evaluate the progress routinely.
- Minimize the time on Internet for nonscientific browsing. Just because you are sitting at your desk does not mean that your day was productive.
- HAVE FUN, BUT REMEMBER TO PUT IN MINIMUM OF **EIGHT PRODUCTIVE RESEARCH HOURS** IN THE LAB DURING WEEKDAYS.
- **IT IS YOUR PhD. IF YOU DO NOT TAKE INTEREST OR PUT HARD WORK INTO IT, NOBODY ELSE WILL!!**

Note: You are a researcher and not a technician.

The role of your advisor is to guide you through your project and help you succeed in your thesis. Don't expect him/her to suggest to you experiments on a daily basis.

Get serious and take responsibility for your own project.

How to successfully complete your Ph. D.

- Complete all departmental requirements within two years
- By the end of summer of second year, you should be able to construct a broad outline of research that you would like to pursue
- The third year is the springboard to explore various facets of your project. You should aim to publish at least one paper (with you as the first author) by third year.
- Schedule the candidacy exam with the graduate school
- Complete your planned experiments during the fourth and fifth years
- Plan on publishing 3-4 papers in high impact journals (with you as the first author in at least 1 or 2 papers).

Note: Each paper can serve as the basis for writing a chapter in your thesis.

- Discuss the plan for writing your thesis with your advisor. Plan to submit the thesis during the fifth or sixth year.

This is an exciting time in your career. Make it a worthwhile effort.

To summarize

Research Ethics is an integral part of graduate research.

STATEMENTS, FIGURES AND TABLES

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(This applies even if it is your own work)

A Call for Cooperation

“We would like to encourage the leaders of academic research groups to inform their students and research associates about the ethical responsibilities of authors of scientific publications and to insure that, when they are given the responsibility for submitting a paper, they are fully aware of the potential consequences, to themselves and to their co-authors, of violations in these ethical guidelines.”

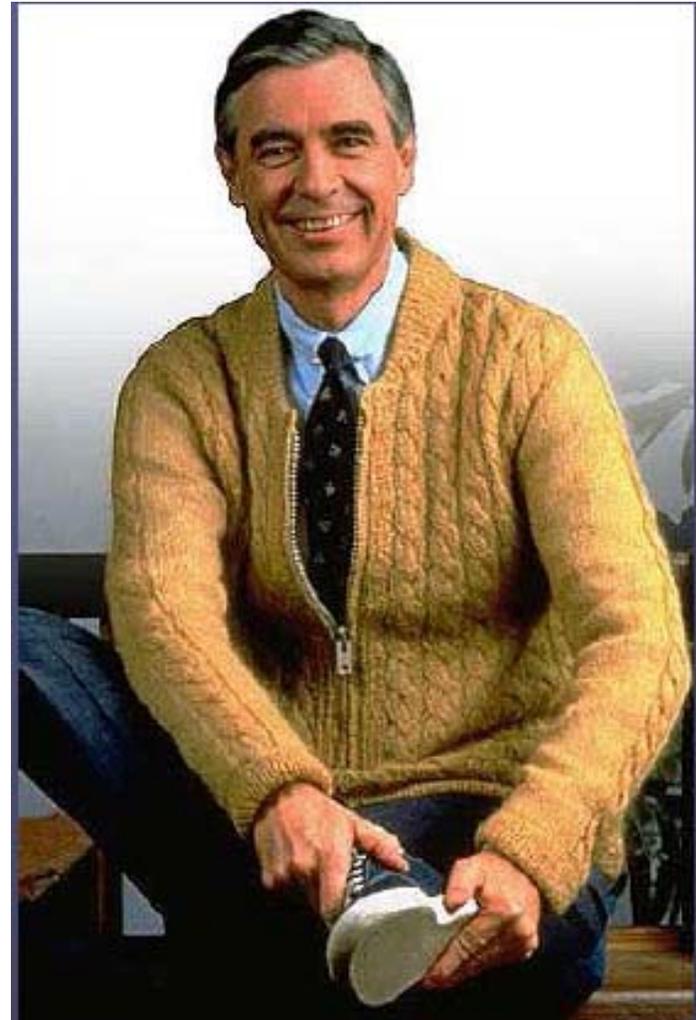
Interrante & Reichmanis, C&EN, Vol 83(6), p. 4 (2005)

“It's not the honors and the prizes and the fancy outsides of life which ultimately nourish our souls.

It's the knowing that we can be trusted, that we never have to fear the truth, that the bedrock of our very being is good stuff.”

- Fred Rogers

Commencement Address at Middlebury College May, 2001



Good Luck!

Your (real) Impact Factor

$$\text{Impact Factor (corrected)} = \frac{\begin{array}{l} \# \text{ times your work is cited} \\ - \# \text{ citations that actually trash your work} \\ - \# \text{ times you cited yourself (nice try)} \\ - \# \text{ times you were cited just to pad the introduction section} \\ - \# \text{ citations the editor pressured the author to include to increase the journal's impact factor} \end{array}}{\begin{array}{l} \# \text{ original articles you've written} \\ + \# \text{ articles you were included in out of pity or politics} \\ + \# \text{ not-so-original articles you've} \\ \quad \text{copied and pasted} \end{array}}$$

Guidelines For Authors and Scientists

- Ethical Guidelines to Publication of Chemical Research (ACS Pubs. Div.) <http://pubs.acs.org/userimages/ContentEditor/1218054468605/ethics.pdf>
- “On Being a Scientist: Responsible Conduct in Research”; National Academy Press, Wash. D.C, 2009
(<http://www.nap.edu/catalog/12192.html>)
- IEEE Policy Statement on Self-Plagiarism
(http://www.comsoc.org/pubs/jrnal/transcom/Self_Plagiarism.pdf)
- Managing Allegations of Scientific Misconduct: A Guidance Document for Editors, January 2000, Office of Research Integrity, Office of Public Health and Science, U.S. Dept. of Health and Human Services
<http://ori.dhhs.gov>