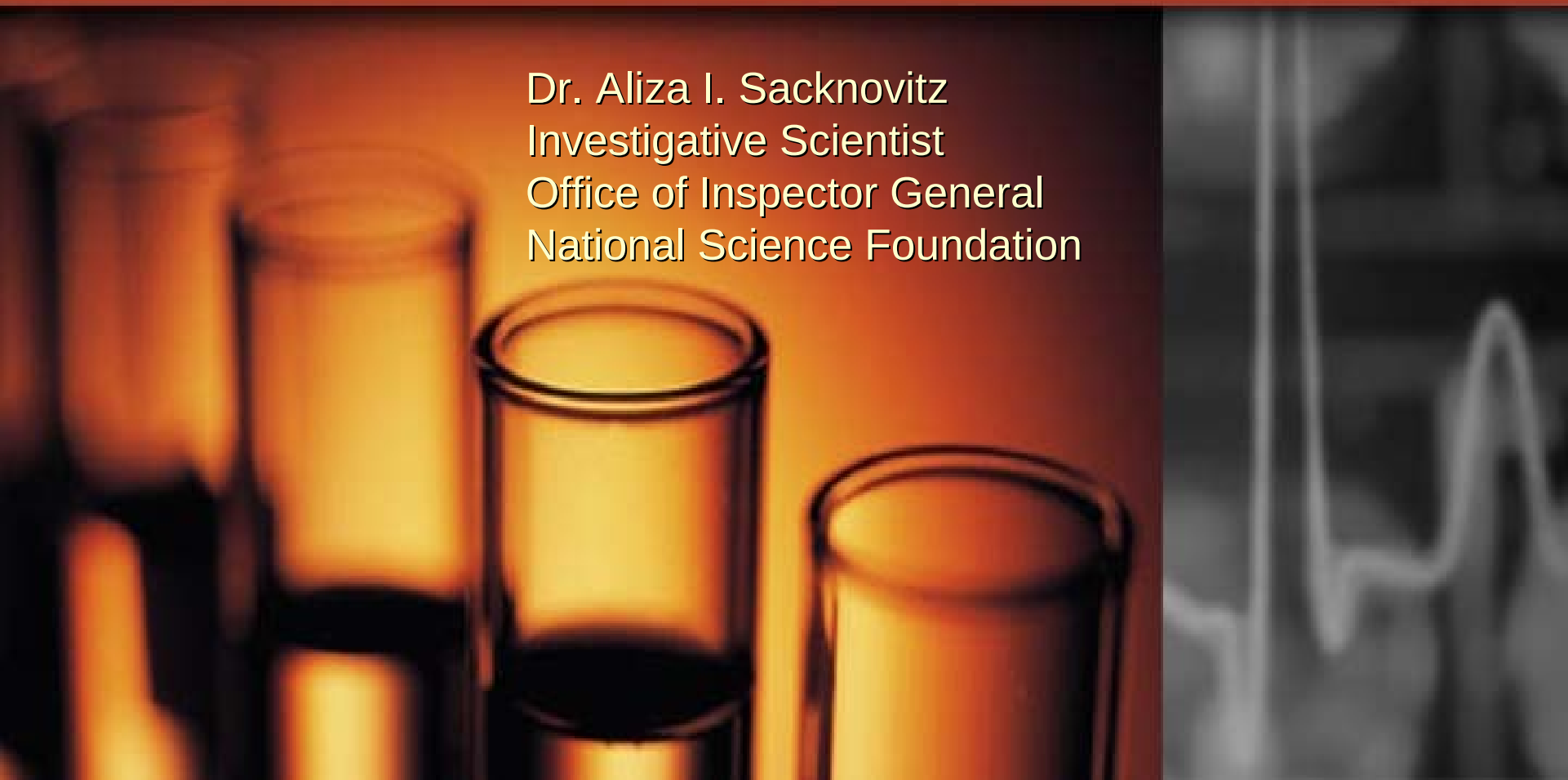
Ensuring and Promoting Research Integrity

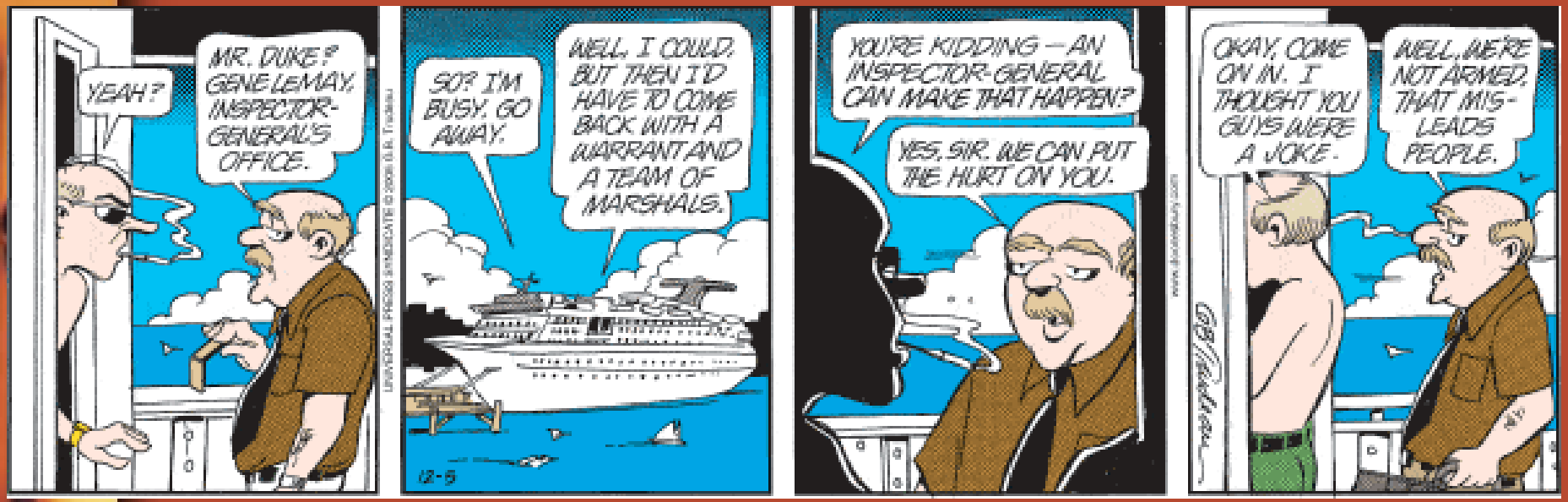


Dr. Aliza I. Sacknovitz
Investigative Scientist
Office of Inspector General
National Science Foundation

Outline

- What does NSF OIG investigate?
  - Research Misconduct (RM)
  - Regulatory Violations (e.g., human and animal subjects)
  - Civil and Criminal Misconduct (fraud and false statements)
- What happens during and at the end of the investigation?
- Research environment
- Where do you fit in?

What's an OIG?



G. Trudeau
Doonesbury, 5 December 2005

Office of Inspector General (OIG)

- Inspector General Act of 1978
- Almost every federal agency/entity has one
- An IG is an independent office for oversight
  - Promote economy, efficiency, and effectiveness…
  - Prevent and detect fraud, waste, and abuse...
    ...in agency programs and operations

- NSF OIG
  - Jurisdiction: NSF activities, programs & operations
  - 38 Audit staff, 22 investigative staff
  - Investigations staff includes:
    Ph.D. scientists — Special agents
    CPAs / CFEs — Attorneys

National Science Foundation

- Independent federal agency created by Congress in 1950 “to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…”
- Budget ~$6 Billion
- Funds for scientific research and education, primarily through grants (not contracts)
- 20% of basic research in America’s universities and colleges
- Major source of federal funding in fields such as mathematics, computer science and social sciences
- No labs or research facilities
- We “buy” science (pennies saved = another grant)

What does NSF OIG investigate?

The simple answer

Allegations of:

Lying

Cheating

Stealing

How does OIG know what to investigate?

Allegations from

- Program officers
- Reviewers
- Colleagues
- Students and post-docs
- University administrators
- People like you
- Anyone with an interest in what NSF funds
- Anonymous

We take a look at things

- Proactive reviews
- Recurring problems

Research Misconduct (RM)

- Federal-wide definition and procedural framework.
- RM means fabrication, falsification, or plagiarism in proposing or performing research [], reviewing research proposals [] or in reporting research funded by [the agency]. 45 C.F.R. 689.1.a
- RM is not an honest error or a difference of opinion

Fabrication: making up data or results and recording or reporting them

Falsification: manipulating materials, equipment, or processes, or changing or omitting data or results

Plagiarism: appropriation of another person's ideas, processes, results or words without giving appropriate credit.

Useful Tidbits about RM

- Copyright permission/public domain has nothing to do with plagiarism
- Text *or* ideas may be copied
- Even paraphrasing requires citation
- “NSF expects strict adherence to the rules of proper scholarship and attribution” for the *whole* proposal
- The author should be named in the proposal - somewhere
- All authors share the credit or allegation equally unless evidence shows otherwise

More Useful Tidbits about RM

- Avoid “cleaning up” the figures
  - If the editor requires it, get it in writing
  - Report the “enhancements” in the paper/proposal
- Review your students’/postdocs’ data
- Keep good records / notebooks
- Keep raw data

Other Regulatory and Rule Violations

- Human Subjects / Animal Welfare non-compliance
- Violation of NSF Reviewer Confidentiality
- Improper Financial Conflicts/Disclosures
- Mismanagement of Funds
  - Program Income
  - Participant Support
  - Travel-related issues
  - Time and effort reporting

Civil/Criminal Misconduct

- False statements and False claims
  - Certifications are especially important
  - Criminal sanctions – fines and jail
  - Civil sanctions – up to triple damages possible
- Embezzlement and other financial crimes
- Falsification of evidence
- Mail fraud and Wire fraud
  - NSF FastLane system

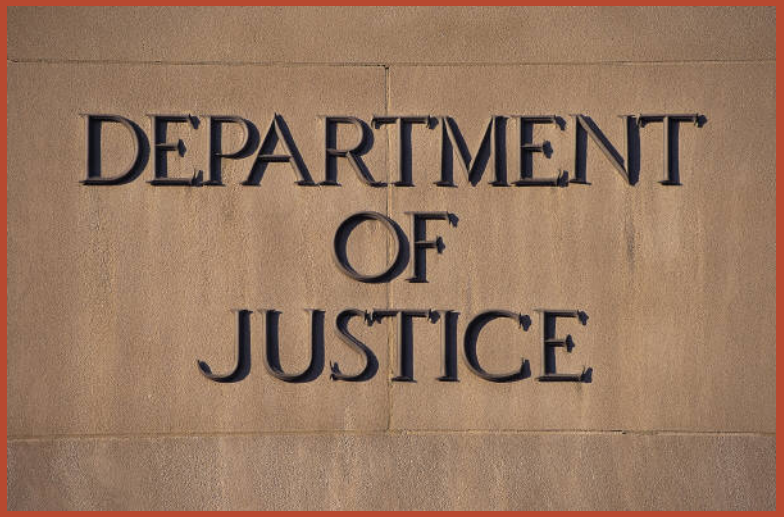
When Administrative Cases turn Civil/Criminal

Case Study #1

- PI submitted his former graduate student's thesis chapter as an SBIR-I proposal ($100K, 6 months)
- When awarded PI used the money to pay his child's tuition at an ivy league university, and other personal expenses
- PI copied the thesis into his final report and proposal for SBIR-2 award ($500K)
- University notifies OIG of plagiarism allegation

Case Study #1

- NSF suspended the award and OIG issued subpoenas.



- OIG referred the case to DOJ, who accepted it for prosecution.

Case Study #1

- At a meeting with DOJ, the professor through his attorneys indicated he would like to
  1) Plead guilty to a criminal count (1001) and pay $240,000 restitution
  2) Avoid jail
  3) Avoid Federal action against his wife

- NSF OIG recommended RM finding and debarment.

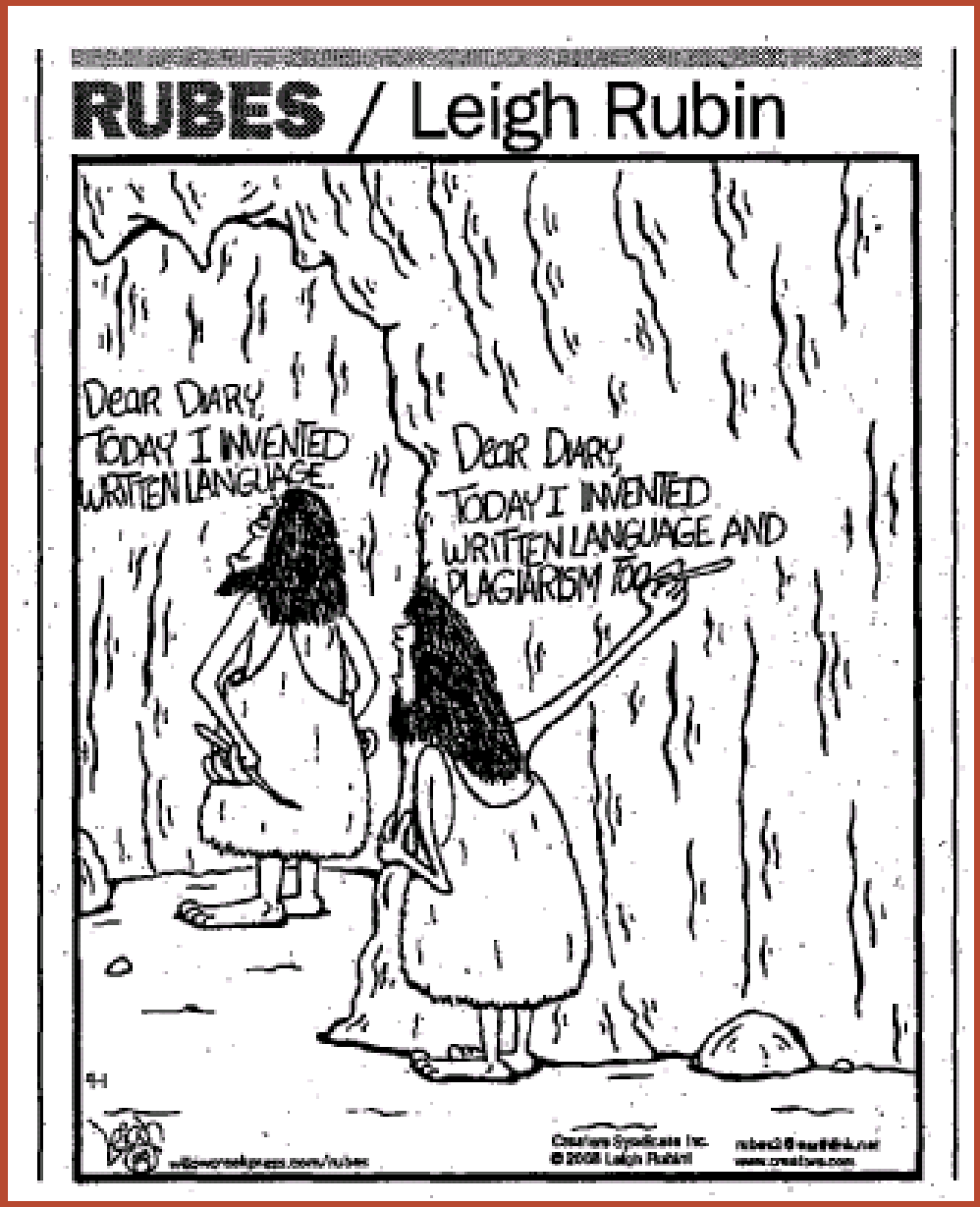
- Professor and NSF settled for 3 years voluntary exclusion from Federal funding.

What we don't do

- General quality of science
- Academic Divorces
- Patent, copyright, or programmatic disputes
- Institutional personnel issues that do not violate statutes, regulations, or grant conditions connected with NSF programs
- Authorship disputes

  i.e., Whose name goes on the paper? In what order?

However omission of a name could be intellectual property theft, which we do investigate.


RUBES / Leigh Rubin
DEAR DIARY, TODAY I INVENTED WRITTEN LANGUAGE.
DEAR DIARY, TODAY I INVENTED WRITTEN LANGUAGE AND PLAGIARISM TOO.
Creators Syndicate Inc.
© 2008 Leigh Rubin
www.creators.com

Procedure

Allegation
Inquiry
Investigation
Decision

NSF Grant Conditions
If institution determines that an investigation is needed
it MUST notify NSF immediately

Timeline of an Investigation

Step	Time-frame Targets	
1. Receipt		
2. Inquiry	90 days - OIG	90 days - Awardee
3. Investigation	180 days - OIG	180 days -Awardee
4. Adjudication	120 days - NSF	
5. Appeal	30 days - NSF	

- Case may close at any step
- Referral:
  - Awardees - 88% of investigations
  - 66% reports accepted
- Provide on-site assistance

The Inquiry

- Where
  - Institution
  - Agency
- Purpose
  - Determine need to go to detailed investigation
- Subject and ONLY the Subject notified, unless otherwise necessary

The Investigation

FACT FINDING

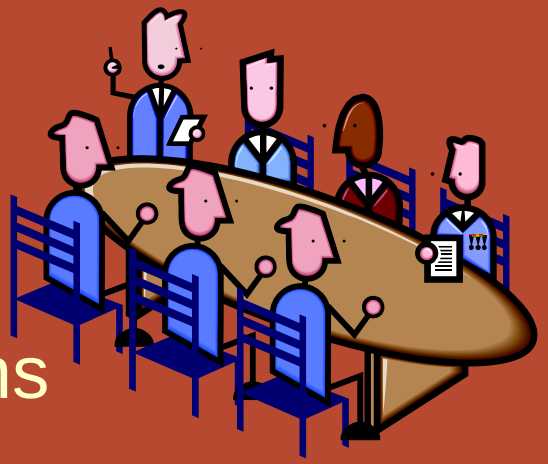
- Assess Who? What? When? Where? How?
- Interview witnesses
- Maintain supporting documents
- Schedule regular case review and analysis
- Consider alternative hypotheses
- Acknowledge (resolve) inconsistencies
- Establish perspective for the actions

Investigation Process

- NSF OIG:
  - Notifies Subject, unless otherwise necessary
  - Refers investigation to institution or conducted by the funding source(s)
  - Defers pending institution report
    - Accepts report in lieu of investigation
    - Supplements institution investigation
    - Starts own investigation

NSF NOT BOUND BY INSTITUTION'S FINDINGS

Referring the Investigation to Awardee Organization



- Institution usually appoints a committee
- Committee member obligations
  - Follow the institutional policy
  - Explain the decision as supported by the evidence-transcripts, etc
  - Maintain confidentiality
  - Watch out for “faculty / student double standard”
  - Maintain independence

Committee / Institution Determination

- Act meet definition?
- Proper intent level?
  - Careless
  - Reckless
  - Knowing
  - Purposeful
- Standard of proof?
  - Preponderance vs. Beyond a reasonable doubt
- Significant departure from accepted practice?
- Make sure actions protect Institution’s interests

Evaluation of Grantee Investigation Reports

- Incomplete documentation
- Avoidance of difficult direct questions
- Unsupported conclusions
- Different perspective on significance
- Unbalanced adjudication

Adjudication

- Case close for lack of evidence

  Majority of cases

- If sufficient evidence
  - OIG reports to the decision maker:
    - NSF Office of the Director for RM and other regulatory issues
    - DOJ for Civil/Criminal
- OIG makes recommendations; OIG does not decide

Factors Considered in Making Recommendations

Based on an evaluation of:

- scientific community's assessment
- seriousness
- intent
- evidence of a pattern
- involvement of other awards or agencies

NSF actions reflect community standards and protect Federal interests.

Possible Actions

- Whatever sanctions the institution makes

From the NSF/Federal side of the issue . . .

- Letter of Reprimand
- Ban from serving as a reviewer
- Ethics Training
- Certifications
- Assurances
- Federal-wide Debarment
- Fines / Restitution
- Prison

"He was copying from the other students."

Hemispheres Magazine, United Airlines, June 2006, p. 80.

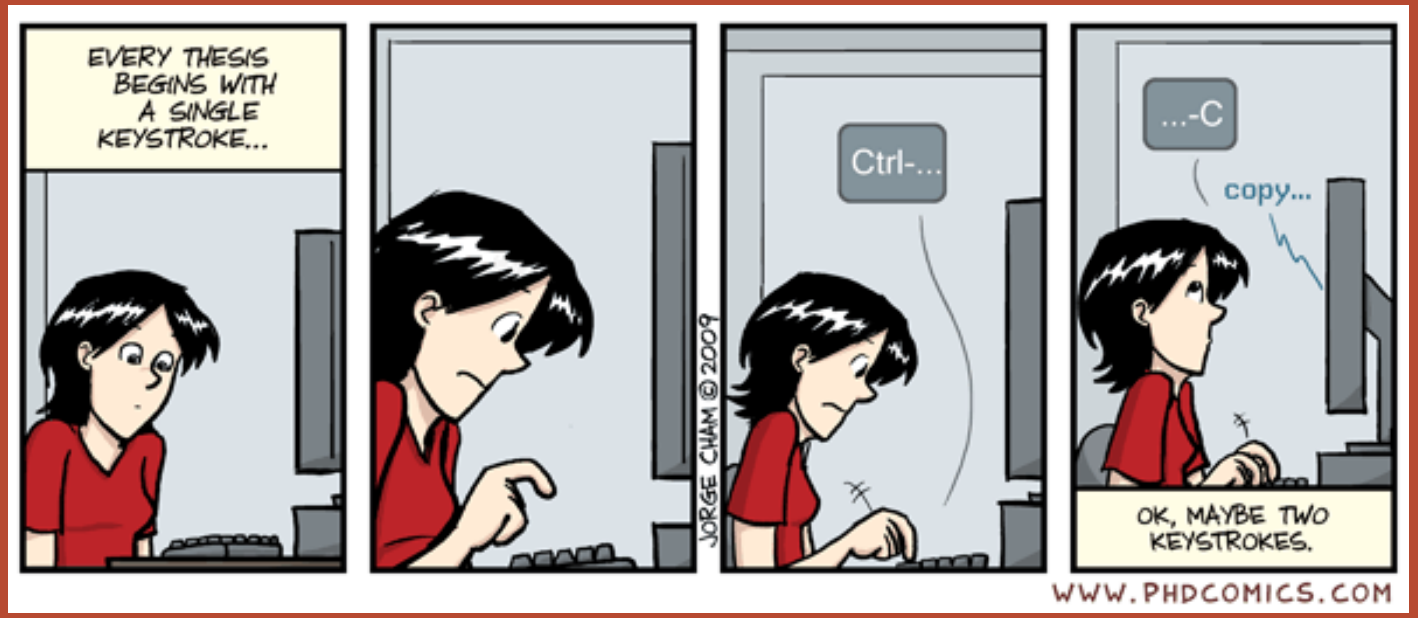
The Research Environment

- Number of women, minorities and foreign-born dramatically increasing in research work force.
- Aging and retiring research workforce
- Science and engineering occupations are an increasing percentage of workforce (only 10% hold doctorates)
- R&D $ are continually increasing

  http://www.nsf.gov/statistics/seind06/figures.htm
- 75% of high school students admitted to cheating
- 53% of undergraduates admitted to cheating
- 30% of researchers admitted to “questionable practices”
- NSF has observed a doubling of allegations and increasing numbers of serious cases resulting in RM findings

Research Without Borders

- International collaborations
- Equipment
- Foreign students / foreign faculty
- Human subjects research
- Peer reviewers



PhD Comics 4/10/2009

Challenges

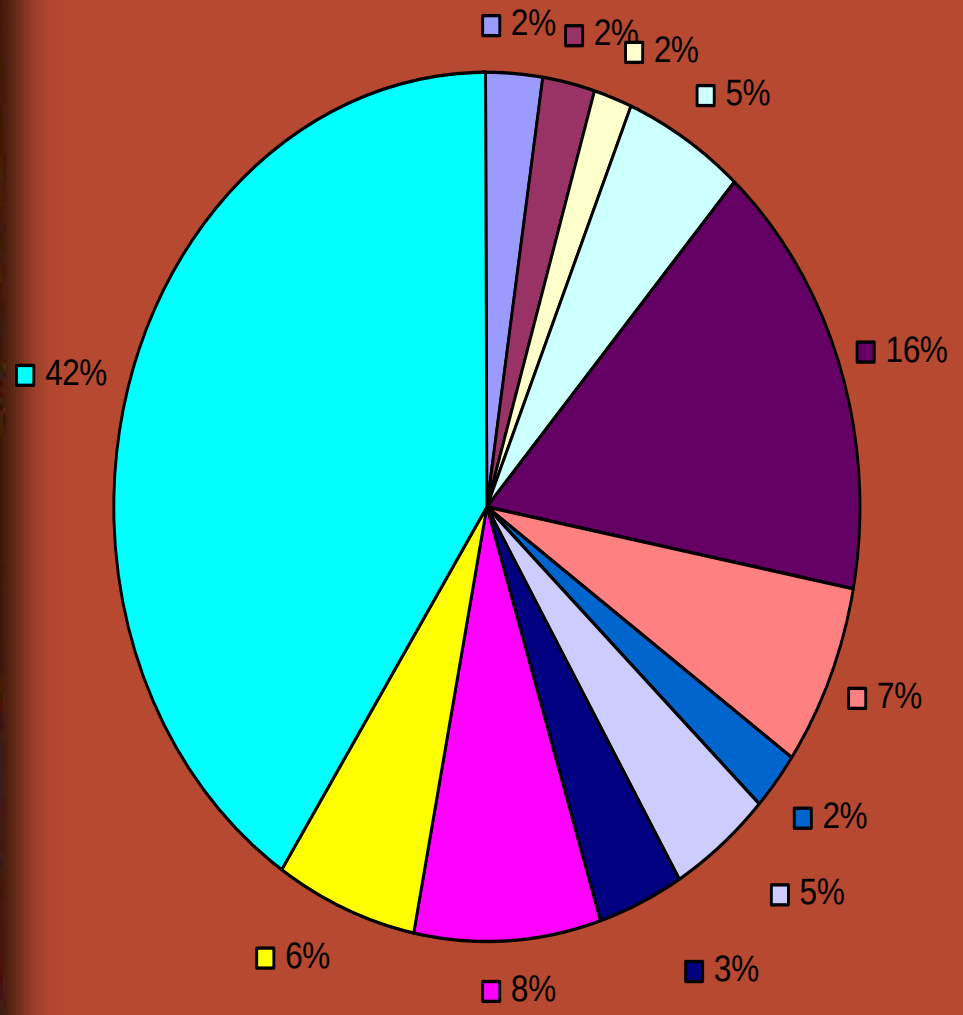
- Erodes public confidence in research, research integrity, and supporting R&D
- Strains relations among scientists and international collaborations
- Raises questions of government/compliance officials' roles & responsiveness
- Reverses evolution of scientific progress
- Attracts widespread media attention
- Raises international concerns

OIG Investigative Statistics

Semiannual Period: October 1, 2008 – March 31, 2009

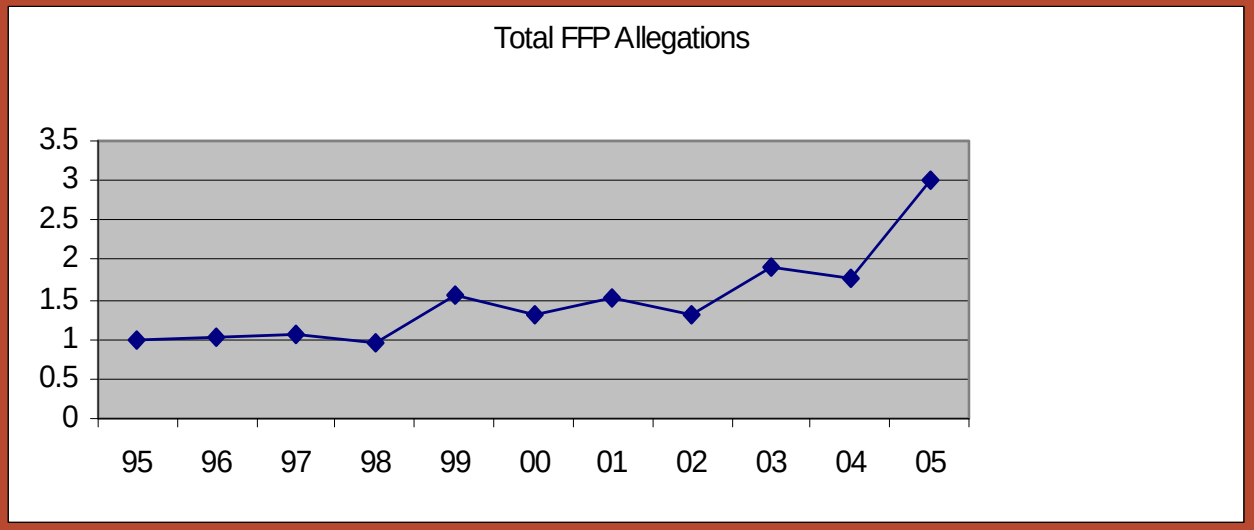
	Administrative Investigations
Active Cases Period Start	60
Opened Cases	45
Closed Cases	33
Active at Period Close	72

Common Types of Administrative Allegations



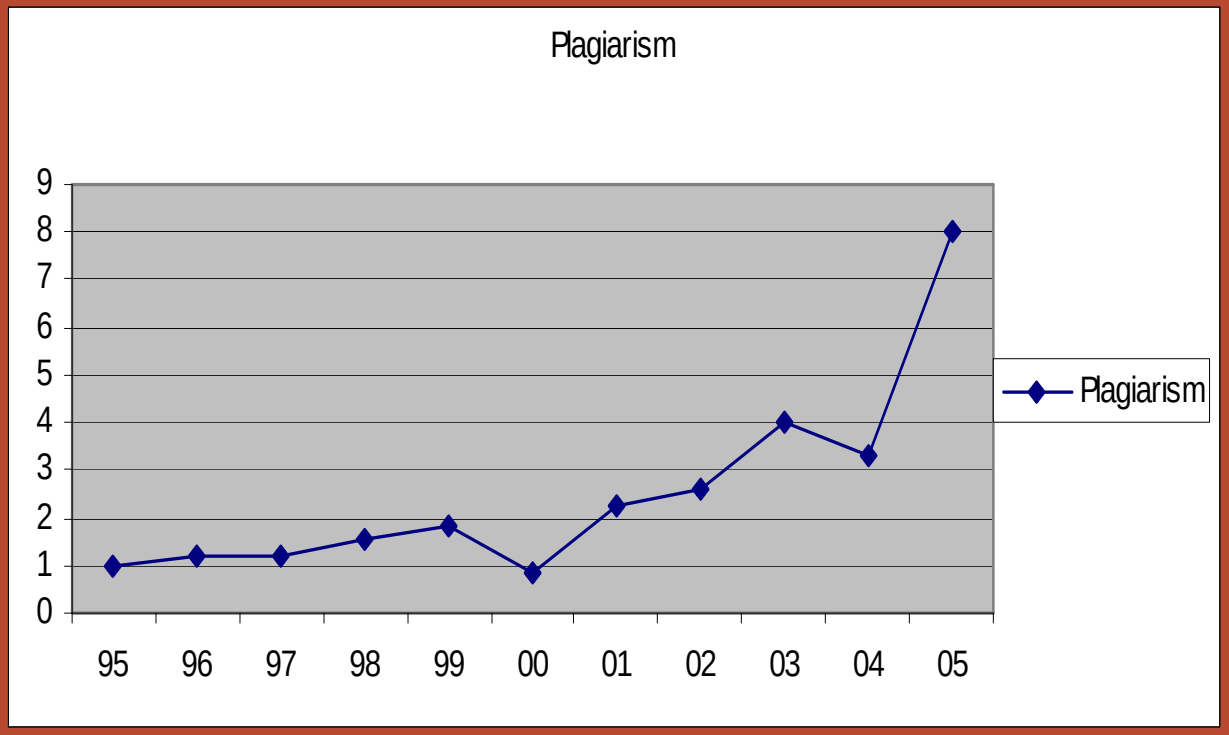
Trends

(x=year, y= relative increase, base year 1995)



Trends

(x=year, y= relative increase, base year 1995)



When you start looking, you can find interesting things!

RM from the March 2009 Semiannual Report

- Professor Copied from a Funded CAREER Proposal into his Own
- PI copies Substantially From an NSF Proposal Posted on His University's Website
- PI Breaches Confidentiality, Then Alters Documents and Fabricates Story to Mask Plagiarism
- PI Includes No Citations in Two NSF Proposals

More RM Case Examples . . .

- NSF Funded Postdoctoral Fellow Falsifies Research Data (September 2006)
- Professor Reviews Proposal for NSF, Then Plagiarizes It Into His Own Proposal (Sept 2007)
- Student Claims “Laziness” Caused Him to Fabricate/Falsify Data in Four Manuscripts (Sept 2007)

Hall of Shame of Excuses

- I didn’t do it. My grad student/undergraduate/postdoc/grant writer/faculty colleague/secretary/Co-PI/SRO/AOR/VP of Research/Dean/spouse wrotethat section.
- It’s only background/introductory material (or it had no technical merit).
- The reviewers are smart enough to know what is my work and what is someone else’s.
- It’s in the public domain.
- It’s not plagiarism; it’s just bad citation.
- I used the same words, but I meant something different.
- There's no other way to say that.
- I didn't have space for all the citations
- “It’s only a proposal. It’s not like it’s a publication”
- “Fastlane removed all the quotation marks”
- “My English teacher told me it’s not plagiarism if I change every 7th word.”
- “I was told that having between 70-80 citations in a proposal was enough.
- Anymore and I would look like I wasn’t proposing to do something new.”


I HEAR YOU GOT A JOB WRITING HOROSCOPES.
YEAH. HERE'S WHAT I WROTE FOR TAURUS: "THE FAULT, DEAR BRUTUS, IS NOT IN OUR STARS, BUT IN OURSELVES."
YOU FRAUD. THAT WAS WRITTEN BY SHAKESPEARE.
WELL, I WROTE IT, TOO.
HE WROTE IT FIRST.
GOOD LITERATURE IS NOT A RACE.
© 2005 Stephan Pastis Dist. by United Feature Syndicate, Inc.
© Stephan Pastis/Dist. by UFS, Inc.

Where do you fit in?

Complainant? Whistleblower?

Investigation Committee Member?

Witness? Subject?

Administrator? Adjudicator?

Integrity is a Partnership

- The Agency (NSF)
  - OIG
  - Program officers
  - Grants officers
- Institution Officials
  - Administrative
  - Financial
  - Education
- Researcher
  - Students
  - Colleagues
  - Postdocs
  - Administation

YOU

Expectations

- **NSF/Federal Gov't**
  - Clear articulation of rules/expectations
  - Balance compliance, institution responsibility, and latitude
  - Numerous funding opportunities
- **Institution**
  - An environment in which employees can operate with integrity
  - Responsible administrative, financial, and research management and oversight (e.g. Article 1, GC-1, OMB Circulars)
- **Principal Investigators**
  - **Overall -- Uphold ethics and standards of community**
  - Submit quality proposals and conduct the funded activity
  - Know and adhere to rules, regulations and ethics
  - Ensure compliance and education of staff, students

Acting with Research Integrity

A well-imbued sense of research integrity guides choices and decisions

Integrity is NOT optional

Ethical Issues you will Confront

- Data Selection
- Sharing and Using Ideas
- Balancing priorities
- Making Financial Decisions
- Collaborations (Authorship, Acknowledgements)
- Conflicts of Interest
- Paraphrasing and Plagiarism
- Mentorship/Advisor Problems
- Merit Review
- Obtaining Oversight Reviews

Data Issues

- Full disclosure, cleaning, fudging, falsification, fabrication
- Share with whom, when, what restrictions and agreements?
- Who owns the data?

Data Issues: Fabrication

Case Study #2

- University notifies us that data submitted in NSF proposal may have been fabricated
- Student conducting survey research
- Results looked very promising (too promising)
  - Mentor's colleague states such
- Mentor submits NSF proposal but then questions student on veracity of data
- Student suggests proposal be withdrawn
- Begins to claim data was analyzed by unknown individual—data exchanges via email

Case Study #2

- Unknown person then sends email to mentor stating data are made up, apologized, and deleted account
- University investigates, determines student made up data.
- Student does not deny the data were fabricated and continues to blame unknown person

Case Study #2

Results

- Student dismissed from University
- NSF Debars student for 3 years
- OIG suggests to PI to exercise more oversight of students

Data Issues: Fabrication

Case Study #3

- PI fabricates the existence of two manuscripts in his CV and makes reference to a non-existent manuscript in the text of his proposal
- PI admits that manuscripts did not exist.
- Showed a pattern of deceit about these manuscripts in other scientific proposals submitted to other funding sources
- Institution finds research misconduct and PI's employment is terminated
- NSF makes finding of research misconduct – letter of reprimand and 3 yrs of certifications

Sharing and Using Ideas

- Ideas are “in the air”, a continuum, unique,
- Agreements, seminars and meetings
- Sharing manuscripts, proposals

? PI shared manuscript with another researcher who refined it, was named as a co-author and then used the manuscript in NSF proposal without PI. Concluded this was an authorship dispute.

Sharing and Using Ideas

Case Study #4

- A foreign graduate student (Student) left a US laboratory with a draft copy of a paper and raw data, abruptly returned to his home country (HC) research laboratory, published the paper in an online journal and deposited the data into an online databank.
- Both the paper and data ascribe authorship to the student and other individuals in or associated with his HC laboratory.

Case Study #4

Case Development

- US mentor contacted student saying he intended to publish the paper with student as first author
- In HC, student chose to work on project identical to that of his US lab
- Student provided HC mentor with draft paper of what he ostensibly conducted in his HC laboratory
- US mentor discovered online paper and requested information from HC mentor
- Both mentors asked publisher that paper be removed from website
- HC mentor ensured data removed from online databank
- Student returned the research materials to the US institution

Case Study #4

- Published paper identified 6 authors, none of whom participated in gathering the data described and contained within the paper.
- No reference or acknowledgement was made to student's co-author and US faculty mentor
- US manuscript and the published paper were virtually identical except for name assigned to the sequence under study, methods description, and acknowledgements

Case Study #4

Conclusions

- US University found student committed intentional acts of misconduct and took deliberate actions to deceive and conceal his actions
  - Barred the subject from employment at the University for 5 years
  - Relayed the report to the HC institution
- HC University
  - Removed him from the school register and barred him from returning to the school
  - Barred from employment or any other activity for 5 years
- NSF made a finding of research misconduct, sent the student a letter of reprimand, and debarred the student for 5 years

Making Administrative and Financial Decisions

- Adhering to NSF's grant conditions
- Understanding what you can and can't buy
- Proper use of Participant Support

? PI purchases personal books and uses telephone for personal business. PI required by institution to reimburse grant; More serious cases become civil, criminal issues resolved with DOJ.

? PI uses grant monies to make over $300K of personal purchases. Fired, convicted, serving 2 yr sentence, court ordered restitution from retirement accounts.

Making Financial/Administrative Decisions

Case Study #5

- PI receives grants to work with foreign collaborators—mostly travel money to assist collaborator visit to US
- PI claims post 9/11 international travel difficult
- PI unilaterally decides to put grant monies to other related research
- Files false final report stating collaboration occurred
- PO meets alleged collaborator at foreign conference, who knows nothing of research
- Extensive travel for Lab Tech
- Lab Tech turns out to be spouse
- Institution supposedly aware of the COI
- Institution returned money; PI debarred 3 years

Collaborations

- Written agreements on work, authorship, proprietary nature, subsequent use, data management and rights

? NSF funds collaboration to research three distinct tribes in South America—each of three PI's to contribute to comparative study. After study complete, on PI writes paper on her own data and says tenure pressures forced her to complete paper and focus on completing a book. Determined it was an NSF management issue…formal agreement might have allowed us to seek some measure of enforcement.

Written Agreement

- OECD GSF *Investigating Research Misconduct Allegations in International Collaborative Research Projects: A Practical Guide*

We, ( ), agree:

- to conduct our research according to the standards of research integrity, as defined in "Investigating Research Misconduct Allegations in International Collaborative Research Projects[1]: A Practical Guide" (www.oecd.org/sti/gsf) and other appropriate documents, including: (*specify the national codes of conduct and disciplinary or national ethical guidelines that apply*);
- that any suspected deviation from these standards, in particular alleged research misconduct, will be brought to the immediate attention of (*all designated contact point(s)*) and investigated according to the policies and procedures of (*to be filled in with the body with primary responsibility*), while respecting the laws and sovereignty of the states of all participating parties;
- to cooperate in and support any such investigations; and
- to accept (subject to any appeal process) the conclusions of any such investigation and to take appropriate actions.

Conflicts of Interests

- Balancing and Disclosing Financial and Commitment conflicts
- What are conflicts?
- SBIR vs. basic research awards
- Working with Industry

? PI has research grant and private business. Use NSF funds to support travel costs for business. Fraud, Conflict of Interest

? PI wants to higher sister-in-law as administrative assistant—university denies. Contracts for administrative services with a private company—later found to be owned by brother. COI and PI was forced to repay funds.

Paraphrasing/Plagiarism

- **Background, methods, research plan and ideas**
- **Common knowledge, limited usage, adequate citation**

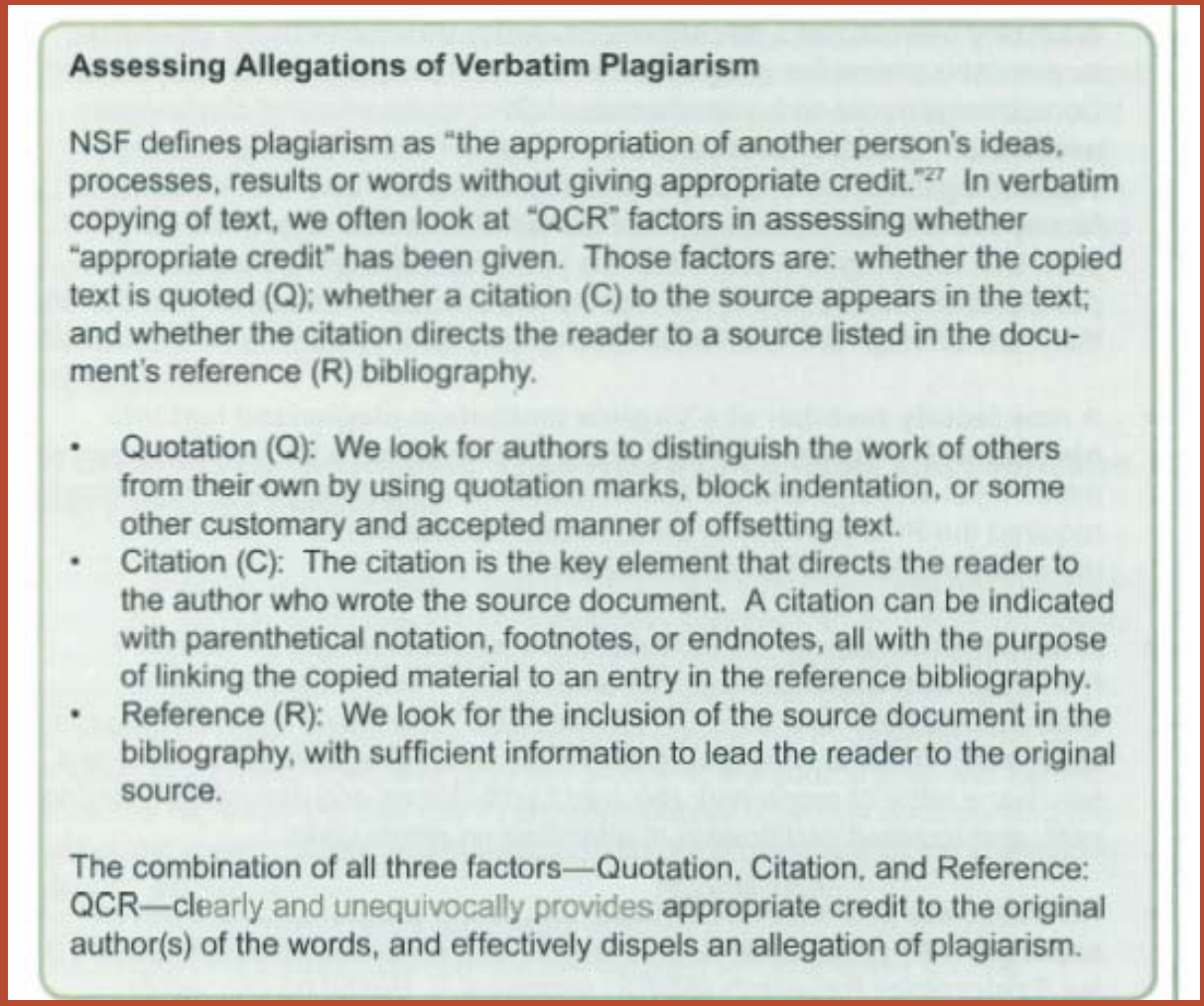
? How much can you copy without attribution and offset before it becomes misconduct? When must you provide attribution?

? Proactive study with plagiarism software. Rate of 2.5% overall

Plagiarism: Described

- Undistinguished, uncited words or ideas of another
- Sources
  - Papers, proposals, web sites, manuscripts, conversations
  - Students, peers, collaborators, colleagues, literature
- Detection
  - Students, peers, collaborators, colleagues
  - Visual inspection, language differences
  - Computer software

Plagiarism: Described



Assessing Allegations of Verbatim Plagiarism

NSF defines plagiarism as "the appropriation of another person's ideas, processes, results or words without giving appropriate credit."[27] In verbatim copying of text, we often look at "QCR" factors in assessing whether "appropriate credit" has been given. Those factors are: whether the copied text is quoted (Q); whether a citation (C) to the source appears in the text; and whether the citation directs the reader to a source listed in the document's reference (R) bibliography.

- Quotation (Q): We look for authors to distinguish the work of others from their own by using quotation marks, block indentation, or some other customary and accepted manner of offsetting text.
- Citation (C): The citation is the key element that directs the reader to the author who wrote the source document. A citation can be indicated with parenthetical notation, footnotes, or endnotes, all with the purpose of linking the copied material to an entry in the reference bibliography.
- Reference (R): We look for the inclusion of the source document in the bibliography, with sufficient information to lead the reader to the original source.

The combination of all three factors—Quotation, Citation, and Reference: QCR—clearly and unequivocally provides appropriate credit to the original author(s) of the words, and effectively dispels an allegation of plagiarism.

guaranteed. This could potentially be reduced by (i) polymer films deposited on the window, and (ii) strain on the glass of the window. Both factors can potentially reduce the light passing through or may induce birefringence, which, in turn, may alter the polarization state of the beam. To minimize birefringence, we will ensure that the beam will enter normal to the plane of the window. In addition, heating the window along with the surrounding will prevent polymer deposition. This will require temperature of above 100 °C. Since the high temperatures may cause additional strain, we will use fused silica windows that are mounted via a viton-based O-ring seal. The windows are relatively inexpensive, and easy to replace, for the case, that polymer deposition may occur after long operation times in spite of the heating.

(2) Issues regarding software integration. The instrument will be communicating through RS-232 or TCP/IP network protocols with an external computer. This will allow commands to be sent to start and end data acquisition as well as retrieving values determined by the data analysis. Eventually, we intend the instrument to be fully integrated as descried in section 5.2.8.

5.2.6. Mass Spectrometer (MS). Monitoring the real time composition of the vapor prior to and during deposition will enhance our fundamental understanding of CVD polymerization, which is a rather unique polymerization type in that it follows a living radical mechanism. Process gas analysis will be an indispensable tool for these fundamental studies.[60] In CVD polymerization, polymer films are made form [2.2]paracyclophanes, which are activated previous to polymerization. The quality of the CVD film depends on impurities in the process gas mixture and also on the operating conditions in the CVD reactor. Process impurities and CVD reaction products can both be determined using gas analysis.[61] The detection of unreacted [2.2]paracyclophanes and high molecular-weight side-products requires a mass range from 0 to 510 amu. In addition, impurities in the process can arise from many sources: (1) Air leaks from atmosphere to the process gas through gaskets, fittings, regulator valves or gas delivery lines. (2) Virtual air leaks from fittings inside the process vacuum chamber, which can trap gas when the chamber is vented. (3) Residual water vapor in the process chamber or gas inlet lines. (4) Solvents used to clean parts of the vacuum system or substrates for example acetone, alcohol, freon, trichloroethane. (5) Backstreaming from the vacuum pumping system contributes high molecular weight hydrocarbon contamination.[62]

For this reason, we propose the integration of a process gas analysis system consisting of a high performance quadrupole mass spectrometer, a differentially pumped housing and specially designed orifice inlet. The inlet and the detection chamber will be heated to avoid film deposition due to polymerization. The vacuum system is pumped by a turbomolecular pump and backed by a mechanical pump. We also seek to integrate a combination of Faraday and SEM detectors into the system, which will give as excellent precision and flexibility.[63]

5.2.7 Quartz crystal microbalance (QCM). The quartz crystal microbalance is a piezoelectric transducer widely used in vacuum deposition systems. These devices allow a mass change, occurring during a deposition process, to be converted into a resonant frequency change, which is an easily measurable signal. Crystal failures are often observed and can be caused by mode hoping to other (anharmonic) resonant frequencies due to the buildup of composite resonant modes, deviations from theory due to fringing electrode fields developed between the electrodes and the film, and unexpected shifts in fundamental frequency due to stress build up on the crystal surface. We will address these issues twofold: (i) The combination of QCM and SE enables individual calibration that will be conducted in real time and in situ. This will improve the precision of our measurements and also will provide evidence regarding the limitations of the QCM. (ii) The proposal suggests the use of a QCM that features a separate, internal oscillator, which drives the RF circuitry (such as Inficon's XTC-2). In contrast to conventional systems, power is delivered to the crystal as a group of fixed frequency waves. This instrument further includes an intelligent feedback link, which examines the crystal phase and voltage characteristics continuously, while the wave packets are sent. The circuit then corrects the oscillator frequency for the next wave packet and prevents mode hoping and unexpected frequency jumps, as long as the deposition rates large compared to the wave packet frequencies.

5.2.8 RS-485/232 interface board, TC board, and Labview software for online process control. All process components and the QCM will be equipped with either a serial interface (RS 232 or RS 485). The serial interfaces can be integrated through a suitable interface board, e.g. a National Instrument's interface board. Then, all control and monitor operations can be recorded and controlled from a central computer. MS and SE will be integrated via LAN network connections. Finally, the thermocouple output will be immediately transmitted to the computer via a thermocouple board. In this set-up, critical polymerization parameters, such as mass flow, pressure, sublimation and pyrolysis temperature, stage temperature, wall temperature, shutter,

Q

The Quartz Microbalance in liquid

The quartz crystal microbalance is a piezoelectric transducer widely used in electrochemistry. First attempts were made at the beginning of the eightieth. These devices allows a mass change, occuring during an electrochemical process, to be converted, under some conditions, into a resonant frequency change which is an easily measurable signal. The great interest is due to the high mass sensitivity for studying in situ and in real time an electrochemical reaction.

The basic principle is based on the chronometric properties of the resonant device : a resonator in contact with a solution, in general a quartz crystal, is inserted in an electronic circuit which delivers a high stable signal, the entire set up being called oscillator. Whatever the perturbation onto the top of the resonator, this leads immediately to a change of the oscillation frequency, measurable parameter. Through the Sauerbrey relationship, the estimated mass change is calculated via the corresponding frequency change. At 6 MHz, the mass sensitivity reaches 2.5 ng per Hertz with a 0.2 cm^2 active surface which is equivalent to a fraction of adsorbed oxygen onto the surface.

This sensitive tool is developped in our laboratory to get subleties about electrochemical reactions : on the one hand, for the electrochemical kinetic by measuring electrogravimetric [1,2], and on the other hand, for the viscoelastic properties of the added film [3]. Endly, ultra-sensitive transducers are studied to determine with a good accuracy intermediate species involved in various processes [4].

References :

[1] "*a.c. electrogravimetry on conducting polymers. Application to polyaniline*", C. Gabrielli, M. Keddam, N. Nadi et H. Perrot, Electrochim. Acta, 44 (1999) 2095-2103.

[2] "*Separation of ionic and solvent transport during charge compensation processes in electroactive polymers by a.c. electrogravimetry*", C. Gabrielli, M. Keddam, H. Perrot, M.C. Pham et R. Torresi, Electrochim. Acta., 44 (1999) 2095-2103.

[3] "*Étude et mise au point de transducteurs ultra-sensibles fonctionnant en milieu liquide*", D. Bouché-Pillon, Thèse de Doctorat Paris VI, Novembre 1996.

[4] "*Validation of antibody-based recognition by piezoelectric transducers through electroacoustic admittance analysis*", K. Bizet, C. Gabrielli, H. Perrot et J. Therasse, Biosensors and bioelectronics, 13 (1998) 259-269.

guaranteed. This could potentially be reduced by (i) polymer films deposited on the window, and (ii) strain on the glass of the window. Both factors can potentially reduce the light passing through or may induce birefringence, which, in turn, may alter the polarization state of the beam. To minimize birefringence, we will ensure that the beam will enter normal to the plane of the window. In addition, heating the window along with the surrounding will prevent polymer deposition. This will require temperature of above 100 °C. Since the high temperatures may cause additional strain, we will use fused silica windows that are mounted via a viton-based O-ring seal. The windows are relatively inexpensive, and easy to replace, for the case, that polymer deposition may occur after long operation times in spite of the heating.

(2) Issues regarding software integration. The instrument will be communicating through RS-232 or TCP/IP network protocols with an external computer. This will allow commands to be sent to start and end data acquisition as well as retrieving values determined by the data analysis. Eventually, we intend the instrument to be fully integrated as descried in section 5.2.8.

5.2.6. Mass Spectrometer (MS). Monitoring the real time composition of the vapor prior to and during deposition will enhance our fundamental understanding of CVD polymerization, which is a rather unique polymerization type in that it follows a living radical mechanism. Process gas analysis will be an indispensable tool for these fundamental studies.[60] In CVD polymerization, polymer films are made form [2.2]paracyclophanes, which are activated previous to polymerization. The quality of the CVD film depends on impurities in the process gas mixture and also on the operating conditions in the CVD reactor. Process impurities and CVD reaction products can both be determined using gas analysis.[61] The detection of unreacted [2.2]paracyclophanes and high molecular-weight side-products requires a mass range from 0 to 510 amu. In addition, impurities in the process can arise from many sources: (1) Air leaks from atmosphere to the process gas through gaskets, fittings, regulator valves or gas delivery lines. (2) Virtual air leaks from fittings inside the process vacuum chamber, which can trap gas when the chamber is vented. (3) Residual water vapor in the process chamber or gas inlet lines. (4) Solvents used to clean parts of the vacuum system or substrates for example acetone, alcohol, freon, trichloroethane. (5) Backstreaming from the vacuum pumping system contributes high molecular weight hydrocarbon contamination.[62]

For this reason, we propose the integration of a process gas analysis system consisting of a high performance quadrupole mass spectrometer, a differentially pumped housing and specially designed orifice inlet. The inlet and the detection chamber will be heated to avoid film deposition due to polymerization. The vacuum system is pumped by a turbomolecular pump and backed by a mechanical pump. We also seek to integrate a combination of Faraday and SEM detectors into the system, which will give as excellent precision and flexibility.[63]

5.2.7 Quartz crystal microbalance (QCM). The quartz crystal microbalance is a piezoelectric transducer widely used in vacuum deposition systems. These devices allow a mass change, occurring during a deposition process, to be converted into a resonant frequency change, which is an easily measurable signal. Crystal failures are often observed and can be caused by mode hoping to other (anharmonic) resonant frequencies due to the buildup of composite resonant modes, deviations from theory due to fringing electrode fields developed between the electrodes and the film, and unexpected shifts in fundamental frequency due to stress build up on the crystal surface. We will address these issues twofold: (i) The combination of QCM and SE enables individual calibration that will be conducted in real time and in situ. This will improve the precision of our measurements and also will provide evidence regarding the limitations of the QCM. (ii) The proposal suggests the use of a QCM that features a separate, internal oscillator, which drives the RF circuitry (such as Inficon's XTC-2). In contrast to conventional systems, power is delivered to the crystal as a group of fixed frequency waves. This instrument further includes an intelligent feedback link, which examines the crystal phase and voltage characteristics continuously, while the wave packets are sent. The circuit then corrects the oscillator frequency for the next wave packet and prevents mode hoping and unexpected frequency jumps, as long as the deposition rates large compared to the wave packet frequencies.

R1

5.2.8 RS-485/232 interface board, TC board, and Labview software for online process control. All process components and the QCM will be equipped with either a serial interface (RS 232 or RS 485). The serial interfaces can be integrated through a suitable interface board, e.g. a National Instrument's interface board. Then, all control and monitor operations can be recorded and controlled from a central computer. MS and SE will be integrated via LAN network connections. Finally, the thermocouple output will be immediately transmitted to the computer via a thermocouple board. In this set-up, critical polymerization parameters, such as mass flow, pressure, sublimation and pyrolysis temperature, stage temperature, wall temperature, shutter,

Z-match Method

It is generally accepted that when the mass loading from the deposit causes a change in frequency of less than 2% of the frequency of the unloaded crystal, Sauerbrey's equation can be used to obtain accurate results in thin-film thickness calculations[9]. As the thickness of the film increases, the Sauerbrey equation must be extended to incorporate the elasticity of the deposit. Lu and Lewis[10] gave a simple equation (eqn. 5) for the calculation of the dependence of Δf on Δm, which is currently applied by most QCM users to calculate rigid thin-film thicknesses in gas phase depositions.

$$\Delta m = [(N_q \cdot \rho_q)/(\pi \cdot Z \cdot f_L)] \cdot \tan^{-1}[Z \cdot \tan[\pi \cdot (f_U - f_L) / f_U]] \qquad \text{(eqn. 5)}$$

where,

Δm = change in mass per unit area in g/cm^2,

N_q = Frequency Constant for AT-cut quartz crystal = 1.668 x 10^{13} Hz Å,

ρ_q = density of quartz = 2.648 g · cm^{-3},

f_U = frequency of unloaded crystal (prior to deposition) in Hz,

f_L = frequency of loaded crystal in Hz,

Z = Z-Factor of film material = $[(\rho_q \cdot \mu_q) / (\rho_f \cdot \mu_f)]^{1/2}$,

ρ_f = density of film material in g · cm^{-3},

μ_q = shear modulus of quartz = 2.947 x 10^{11} g · cm^{-1} · s^{-2},

μ_f = shear modulus of film material.

This analysis of frequency changes, including the acoustic impedances of the quartz and film, is often called the "Z-match" method. The accuracy of the mass load and film-thickness calculation is often limited by how well the Z-Factor and density of the material are known. Density and Z-Factor values are typically very close to bulk values. The bulk density and shear modulus values for common film materials can be found in many material reference handbooks.

The Lu and Lewis equation is generally considered to be a good match to the experimental results[11] for frequency changes up to 40% (relative to the unloaded crystal). Keep also in mind that the Z-match equation strictly applies to "rigid" deposits. Films which behave viscoelastically, such as some organic polymer films with large thickness or viscosity, will exhibit significant deviations from both equations 1 and 5.

R1

Crystal failures are also often seen before a 40% shift in frequency is reached. Common problems are (1) shorts in the crystal electrodes due to excessive buildup, (2) mode hopping to other (anharmonic) resonant frequencies due to the buildup of composite resonant modes, (3) deviations from theory due to fringing electrode fields developed between the electrodes and the film, (4) unexpected shifts in fundamental frequency due to stress build up on the crystal surface, (5) splitting of source material resulting in non-uniform films, etc.

guaranteed. This could potentially be reduced by (i) polymer films deposited on the window, and (ii) strain on the glass of the window. Both factors can potentially reduce the light passing through or may induce birefringence, which, in turn, may alter the polarization state of the beam. To minimize birefringence, we will ensure that the beam will enter normal to the plane of the window. In addition, heating the window along with the surrounding will prevent polymer deposition. This will require temperature of above 100 °C. Since the high temperatures may cause additional strain, we will use fused silica windows that are mounted via a viton-based O-ring seal. The windows are relatively inexpensive, and easy to replace, for the case, that polymer deposition may occur after long operation times in spite of the heating.

(2) Issues regarding software integration. The instrument will be communicating through RS-232 or TCP/IP network protocols with an external computer. This will allow commands to be sent to start and end data acquisition as well as retrieving values determined by the data analysis. Eventually, we intend the instrument to be fully integrated as descried in section 5.2.8.

5.2.6. Mass Spectrometer (MS). Monitoring the real time composition of the vapor prior to and during deposition will enhance our fundamental understanding of CVD polymerization, which is a rather unique polymerization type in that it follows a living radical mechanism. Process gas analysis will be an indispensable tool for these fundamental studies.[60] In CVD polymerization, polymer films are made form [2.2]paracyclophanes, which are activated previous to polymerization. The quality of the CVD film depends on impurities in the process gas mixture and also on the operating conditions in the CVD reactor. Process impurities and CVD reaction products can both be determined using gas analysis.[61] The detection of unreacted [2.2]paracyclophanes and high molecular-weight side-products requires a mass range from 0 to 510 amu. In addition, impurities in the process can arise from many sources: (1) Air leaks from atmosphere to the process gas through gaskets, fittings, regulator valves or gas delivery lines. (2) Virtual air leaks from fittings inside the process vacuum chamber, which can trap gas when the chamber is vented. (3) Residual water vapor in the process chamber or gas inlet lines. (4) Solvents used to clean parts of the vacuum system or substrates for example acetone, alcohol, freon, trichloroethane. (5) Backstreaming from the vacuum pumping system contributes high molecular weight hydrocarbon contamination.[62]

P1

For this reason, we propose the integration of a process gas analysis system consisting of a high performance quadrupole mass spectrometer, a differentially pumped housing and specially designed orifice inlet. The inlet and the detection chamber will be heated to avoid film deposition due to polymerization. The vacuum system is pumped by a turbomolecular pump and backed by a mechanical pump. We also seek to integrate a combination of Faraday and SEM detectors into the system, which will give as excellent precision and flexibility.[63]

5.2.7 Quartz crystal microbalance (QCM). The quartz crystal microbalance is a piezoelectric transducer widely used in vacuum deposition systems. These devices allow a mass change, occurring during a deposition process, to be converted into a resonant frequency change, which is an easily measurable signal. Crystal failures are often observed and can be caused by mode hoping to other (anharmonic) resonant frequencies due to the buildup of composite resonant modes, deviations from theory due to fringing electrode fields developed between the electrodes and the film, and unexpected shifts in fundamental frequency due to stress build up on the crystal surface. We will address these issues twofold: (i) The combination of QCM and SE enables individual calibration that will be conducted in real time and in situ. This will improve the precision of our measurements and also will provide evidence regarding the limitations of the QCM. (ii) The proposal suggests the use of a QCM that features a separate, internal oscillator, which drives the RF circuitry (such as Inficon's XTC-2). In contrast to conventional systems, power is delivered to the crystal as a group of fixed frequency waves. This instrument further includes an intelligent feedback link, which examines the crystal phase and voltage characteristics continuously, while the wave packets are sent. The circuit then corrects the oscillator frequency for the next wave packet and prevents mode hoping and unexpected frequency jumps, as long as the deposition rates large compared to the wave packet frequencies.

5.2.8 RS-485/232 interface board, TC board, and Labview software for online process control. All process components and the QCM will be equipped with either a serial interface (RS 232 or RS 485). The serial interfaces can be integrated through a suitable interface board, e.g. a National Instrument's interface board. Then, all control and monitor operations can be recorded and controlled from a central computer. MS and SE will be integrated via LAN network connections. Finally, the thermocouple output will be immediately transmitted to the computer via a thermocouple board. In this set-up, critical polymerization parameters, such as mass flow, pressure, sublimation and pyrolysis temperature, stage temperature, wall temperature, shutter,

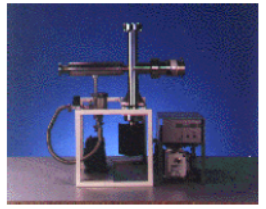
P

HIDEN ANALYTICAL

Gas Analysers - HPR-50

DQ100 / HPR-50. Gas Analyser for Diamond CVD process monitoring

Diamond film quality can be controlled by monitoring the plasma reaction products. Impurity gases can be determined to PPM levels and lower. The key features of the system are low detection limits for impurities, fast response time and an inert heatable all glass inlet.



- Jet separator inert inlet
- ppb sensitivity
- Inert inlet for characterisation of reactive products
- Trend Analysis providing a quality control processing signature for improved reproducibility and better quality control of deposited film.

In diamond growth a methane and hydrogen gas mixture is used to form a plasma discharge from which diamond film is deposited on a heated electrode. The operating pressure is in the range 20 to 400 Torr and the ratio of the partial pressure of methane to hydrogen is between 0.1 and 10%. The quality of diamond film depends on impurities in the process gas mixture and also on the operating conditions in the plasma reactor. Process impurities and plasma reaction products can both be determined using gas analysis. Impurities in the process can arise from many sources.

1. Air leaks from atmosphere to the process gas through gaskets, fittings, regulator valves or gas delivery lines.

P1

2. Virtual air leaks from fittings inside the process vacuum chamber which can trap gas when the chamber is vented.

3. Residual water vapour in the process chamber or gas inlet lines.

4. Solvents used to clean parts of the vacuum system or substrates for example acetone, alcohol, freon, trichloroethane.

5. Backstreaming from the vacuum pumping system contributes high molecular weight hydrocarbon contamination.

P1

6. Outgassing from part of the process cycle for example when a substrate heater is brought to temperature or when the plasma discharge is initiated.

guaranteed. This could potentially be reduced by (i) polymer films deposited on the window, and (ii) strain on the glass of the window. Both factors can potentially reduce the light passing through or may induce birefringence, which, in turn, may alter the polarization state of the beam. To minimize birefringence, we will ensure that the beam will enter normal to the plane of the window. In addition, heating the window along with the surrounding will prevent polymer deposition. This will require temperature of above 100 °C. Since the high temperatures may cause additional strain, we will use fused silica windows that are mounted via a viton-based O-ring seal. The windows are relatively inexpensive, and easy to replace, for the case, that polymer deposition may occur after long operation times in spite of the heating.

(2) Issues regarding software integration. The instrument will be communicating through RS-232 or TCP/IP network protocols with an external computer. This will allow commands to be sent to start and end data acquisition as well as retrieving values determined by the data analysis. Eventually, we intend the instrument to be fully integrated as descried in section 5.2.8.

5.2.6. Mass Spectrometer (MS). Monitoring the real time composition of the vapor prior to and during deposition will enhance our fundamental understanding of CVD polymerization, which is a rather unique polymerization type in that it follows a living radical mechanism. Process gas analysis will be an indispensable tool for these fundamental studies.[60] In CVD polymerization, polymer films are made form [2.2]paracyclophanes, which are activated previous to polymerization. The quality of the CVD film depends on impurities in the process gas mixture and also on the operating conditions in the CVD reactor. Process impurities and CVD reaction products can both be determined using gas analysis.[61] The detection of unreacted [2.2]paracyclophanes and high molecular-weight side-products requires a mass range from 0 to 510 amu. In addition, impurities in the process can arise from many sources: (1) Air leaks from atmosphere to the process gas through gaskets, fittings, regulator valves or gas delivery lines. (2) Virtual air leaks from fittings inside the process vacuum chamber, which can trap gas when the chamber is vented. (3) Residual water vapor in the process chamber or gas inlet lines. (4) Solvents used to clean parts of the vacuum system or substrates for example acetone, alcohol, freon, trichloroethane. (5) Backstreaming from the vacuum pumping system contributes high molecular weight hydrocarbon contamination.[62] P1

For this reason, we propose the integration of a process gas analysis system consisting of a high performance quadrupole mass spectrometer, a differentially pumped housing and specially designed orifice inlet. The inlet and the detection chamber will be heated to avoid film deposition due to polymerization. The vacuum system is pumped by a turbomolecular pump and backed by a mechanical pump. We also seek to integrate a combination of Faraday and SEM detectors into the system, which will give as excellent precision and flexibility.[63]

5.2.7 Quartz crystal microbalance (QCM). The quartz crystal microbalance is a piezoelectric transducer widely used in vacuum deposition systems. These devices allow a mass change, occurring during a deposition process, to be converted into a resonant frequency change, which is an easily measurable signal. Crystal failures are often observed and can be caused by mode hoping to other (anharmonic) resonant frequencies due to the buildup of composite resonant modes, deviations from theory due to fringing electrode fields developed between the electrodes and the film, and unexpected shifts in fundamental frequency due to stress build up on the crystal surface. We will address these issues twofold: (i) The combination of QCM and SE enables individual calibration that will be conducted in real time and in situ. This will improve the precision of our measurements and also will provide evidence regarding the limitations of the QCM. (ii) The proposal suggests the use of a QCM that features a separate, internal oscillator, which drives the RF circuitry (such as Inficon's XTC-2). In contrast to conventional systems, power is delivered to the crystal as a group of fixed frequency waves. This instrument further includes an intelligent feedback link, which examines the crystal phase and voltage characteristics continuously, while the wave packets are sent. The circuit then corrects the oscillator frequency for the next wave packet and prevents mode hoping and unexpected frequency jumps, as long as the deposition rates large compared to the wave packet frequencies. Q1 R1

5.2.8 RS-485/232 interface board, TC board, and Labview software for online process control. All process components and the QCM will be equipped with either a serial interface (RS 232 or RS 485). The serial interfaces can be integrated through a suitable interface board, e.g. a National Instrument's interface board. Then, all control and monitor operations can be recorded and controlled from a central computer. MS and SE will be integrated via LAN network connections. Finally, the thermocouple output will be immediately transmitted to the computer via a thermocouple board. In this set-up, critical polymerization parameters, such as mass flow, pressure, sublimation and pyrolysis temperature, stage temperature, wall temperature, shutter,

Plagiarism
Case Study #6

- An assistant professor submitted an NSF proposal containing 130 lines of text and 1 figure copied from 9 online sources

- Subject apologized extensively
  - "This is my first time to write a proposal in English and submit to NSF"
  - "I was very hurry with that proposal. ..."
  - "I underestimated the process time needed by my university…"
  - "I got my PhD from [ ]. I think that some of not good writing behaviors from [ ] affected my writing for NSF proposal."

Case Study #6

- Subject did not think online resources required citation
- Subject's mentor did not review the subject's proposal because he did not have time
- University report:
  - "[T]he committee believes that although [the subject] knowingly included material from the web, he did not understand the significant of including this material as part of the proposal without appropriate citation."
- NSF OIG noted the subject received all education abroad but worked at University for more than 5 years

Case Study #6

Conclusions

- University found the subject knowingly and recklessly plagiarized material.
- University recommended subject:
  - Be required to attend training
  - Not serve as PI or Co-PI in any grant proposal for 2 years
  - Submit proposals to plagiarism-detection software for 4 years
- NSF made a finding of research misconduct, sent the subject a letter of reprimand, required he complete an ethics course, and submit certifications and assurances with all proposal for 1 year

Plagiarism
Case Study #7

- Proposal submitted to NSF contains text from peer reviewer's journal article.
- NSF proposal contains approximately 1 page of plagiarized text taken from two journal articles and a few web sites
- Confirmed previously identified plagiarism plus found that 20% of the research survey portion of his dissertation was plagiarized (approximately 10 pages)
- Sources – websites
- Not recommended for tenure by his institution
- Has to face actions from degree granting institution
- NSF:
  - Letter of reprimand
  - Certifications for 2 years
  - Complete ethics course

Mentor/Advisor Problems

- He/she took my idea
- I took “my” data/notebook
- Collaboration rules apply here

? Graduate student has a falling out with advisor and finds that data and ideas are used by advisor in publication that fails to provide authorship or acknowledgment to student. Research Misconduct

? Graduate student leaves laboratory either happily or unhappily and takes laboratory notebooks with him/her. Had to return notebooks, may take copies.

General Observations

- Mentor/ Student interaction is a trusted relationship
- We continue to see a slip in the effort that professors put forth to mentor students
- Mentoring off-loaded to PhD or PostDocs

Merit Review

- Confidentiality, sharing proposals

? PI shares proposal received for review with research staff. Member of staff uses text and idea in proposal in own submission. PI violated confidentiality of peer review. Could be barred from participating.

? Reviewer shares proposal with colleague. Colleague then uses small amount of text in his own proposal. Research Misconduct and violation of confidentiality of peer review.

Violation of NSF's Merit Review
Case Study #8

- Subject reviews proposal for NSF in 2006
- Subject submits proposal in 2007 with text copied from reviewed proposal
- Original PI of 2006 proposal reviews subject's 2007 proposal and identifies copied material
- Subject's proposal recommended for funding
- We interview subject who admits copying
- Subject withdraws proposal ($775,000)
- We refer to university for investigation

Case Study #8

- University took a year to ‘investigate’ (subject admitted copying, university decided no investigation necessary); provides poorly written report
- Ambiguous conclusions not supported by evidence
- Inconsistent assessment of intent
- University reprimanded subject; letter in file
- We conducted investigation
- University agreed to revisit its policy
- Concluded IT as well as verbatim plagiarism
- Subject took ethics course; made all his students take ethics course; offered to teach ethics course university-wide
- NSF made RM finding; debarred 1 year; certs 3 years and prohibited subject from reviewing for 3 years

Obtaining Oversight Reviews

- Human / animal / biohazards reviews
- Collection permits

? PI collects endangered species and imports into US without permits. PI removed from grants, action taken by Justice Department

? Review of REU and other educational related proposals lack necessary IRB review..

Preventing Misconduct

- Education
  - Support
  - Mentorship
  - Who's most vulnerable?
- Seminars, incorporate in courses
  - Definition
  - Expectations for ethical conduct
  - Case studies or talking heads
  - Support
- Clarify Collaborations
- Consistent and fair enforcement

America COMPETES Act SEC 7009

“. . . each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project”

NSF Implementation

"Effective January 4, 2010, NSF will require that, at the time of proposal submission to NSF, a proposing institution's Authorized Organizational Representative certify that the institution has a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students, and postdoctoral researchers who will be supported by NSF to conduct research"

Ensuring Research Integrity

- **Teachers: The Front Line**
  - Identify essential elements
  - Applicable across institutional efforts / communities
  - Determine vehicle for delivery
    - » On-line?
    - » Separate classes?
    - » Embedded in other classes (microinsertion)?
    - » Laboratory training?
  - Mandatory / Elective?

- **Teachers and Administrators: Actively ensure integrity**
  - Act with integrity
  - Enforce expectations in classroom
  - Appropriate penalties for wrongdoers, praise for stars

- **Administrators: Articulate and measure achievements**
  - **Manage investigative process**
  - **Report RM to federal agencies as required**

Responsible Professional Practices

- Compliance with rules and regulations
- Peer Review Rules
- Mentor/ Trainee Responsibilities
- Human Subjects Regulations
- Animal Welfare Regulations
- Research Misconduct
  - Fabrication
  - Falsification
  - Plagiarism
- Collaborative Research Practices
- Publication/Authorship Practices
- Resource Management

Responsible Professional Practices

- Data Sharing/ Acquisition/Management/Ownership Practices
- Financial Management
- Conflict of Interest and Commitment
- Laboratory Management Skills (people/supplies)
- Grantsmanship
- Patent Issues
- Global Competence: contributing to knowledge, comprehension, analysis, and evaluation in the context of an increasingly globalized world
- Appropriate alternative actions provided by ethical principles and current professional guidelines
- Ethical reasoning
- Long term development of research agenda

Holding the Line on Integrity

- Act with visible integrity
  - Adhering to the responsible professional practices that are **research** integrity
  - Explaining the expectations, rules-of-the road for Responsible Professional Practices
  - Imbuing the next generation with a sense of responsibility for research integrity

Ultimate Take Home Message

- Research community operates under the assumption that effort is honest and that integrity standards are upheld
- If you uphold the standards, then you can hold the next generation to the same standards
- If you lose your professional reputation, it’s hard to recover

Reputations are Invaluable

THE WASHINGTON POST
3/21/04

Blair's Story: They're Not Buying It

■ Nationwide, few people are buying "Burning Down My Masters' House," Jayson Blair's account of his stint at the New York Times, where he lied his way to prominence. In its first nine days, it sold only 1,386 copies, according to Nielsen BookScan, which registers about 70 percent of sales. But about 50 locals turned out at Karibu Books in Hyattsville on Thursday night to hear Blair speak contritely and brand himself a "journalistic war criminal" who put ambition ahead of integrity. The crowd included Blair's parents, **Frances** and **Thomas Blair** of Centreville, Va., and eight other relatives and family friends.

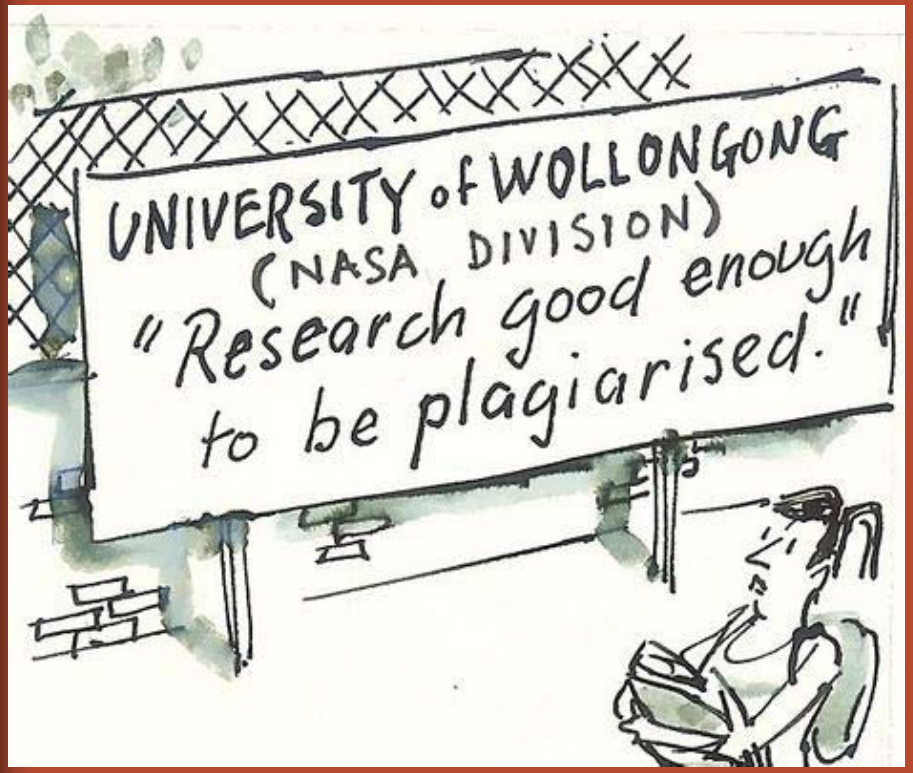
"I don't think he should be let off the hook for what he's done," **Obren Barnes**, a Lanham lawyer, told The Post's Lonnae O'Neal Parker. "But that doesn't mean he can't learn from his mistakes and go forth and do better and be a better person." Barnes didn't buy the

He said he came closest to publicly breaking down during an earlier visit to the University of Maryland, where he attended J-school. "I saw an old friend and I told her, 'You look beautiful.' " Her reply: 'I'm being told I'm beautiful by the biggest liar in journalism.'"

Ethics is choosing among shades of gray

Where do you stand?

Contact Information



Aliza I. Sacknovitz, Ph.D.
Investigative Scientist
asacknov@nsf.gov
703-292-8431

www.oig.nsf.gov

Hotline:1-800-428-2189
E-mail:oig@nsf.gov
Fax:(703) 292-9158

Mail:
4201 Wilson Boulevard
Arlington, VA. 22230
ATTN: OIG HOTLINE