

Proposed Center in Nano/Micromanufacturing and Integration with MEMS/NEMS

Director Peter J. Hesketh, Co-Director Zhong Lin Wang

March 10th at 1:05pm – 1:40 pm Conf Room 295 Love Building

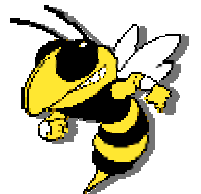
Polycom Video Conference: **IP address: 128.61.136.114**

or free conference call at **319-256-0200 access number 54730#**

Slide presentation is available at: **<http://www.me.gatech.edu/memslab>**

Lead organization: Georgia Institute of Technology

Teaming organizations: Oak Ridge National Laboratories, Sandia National Laboratories, Naval Research Laboratories, and Navy Surface Warfare Center.



Technical Challenges in Nanomanufacturing

in order to achieve integration of nanomaterials in robust systems at reasonable cost and high throughput the following fundamental issues need to be addressed:

Reliability and modeling of nanomaterials

Control of materials processing

Assembly of materials

Interfacial strength and properties of nanomaterials

System level design methods

Large area integration and characterization

Fundamental Issues to be Addressed**Static Component Performance**

Reconfigure, recalibrate components after manufacturing.

Complexity in Component Design and Manufacturing

Adding new component functionality to simplify the overall microsystem design is one approach we are pursuing to mitigate complexity challenges.

Microsystem Optimization at the Nano-Scale

Can we develop a new design strategy based on statistical variation.

Integration of Disparate Materials

Silicon for electronics, indium phosphide for lasers, diamond for heat spreading, and copper for interconnects.

Embedded Control and Sensing

How do we achieve this high level of control and adaptation.

Technical ApproachTask 1: Materials Integration

- Advanced materials process control and optimization
- Assembly of nanomaterials
- Multi-length scale materials interfacing and integration

Task 2: Multifunction and multicomponents integration

- Integration of nanomaterials for batteries, fuel cells and control of micropower on chip
- Reconfigure, fluid network, or impinging jets.
- Integration of biological materials with NEMS.

Task 3: Sensors and actuators systems

- Highly parallel chemical and biological sensors
- Test bed for nano-bio-systems.
- Distributed energy harvesting from the environment.

Anticipated Impact

Increase reliability and functionality of MEMS/NEMS

Test bed systems

- Test bed for nano-bio-system to demonstrate the specific advantages of higher sensitivity and speed of response in nano-bio-fluidic system.
- Optoelectronic system with photonic providing increased accuracy and reconfigurable optical system

Budget:

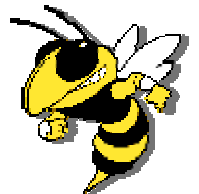
Year 1: 680k, Year 2: 900k, Year 3: 1.35M, Year 4: 0.9M, Year 5: 0.9M, Year 6: 450k

Contact Information

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Key Features of Membership

- Center Board comprises 5 GT Faculty: the Center Director, Co-Director, and three Technical Focus Area Leaders.
- Center Board will make final selection for project funding levels and project duration.
- The center will be responsive to redirection of funding based upon annual progress for each project.
- Biannual workshops to review project progress, facilitate Industry / University / Government Laboratory interactions.
- Pre-proposal support letters include: HoK, Hysitron, Nanophase Tech., nGimat, Naval Research Laboratories, Navy Surface Warfare Center Oak Ridge National Laboratories, RTI International, Rohm and Haas Company, Sandia National Laboratories.
- Membership \$60,000 per annum provides participation in project selection and biannual meetings.
- Associate Membership for small business \$15,000 and Affiliate Membership for Government Laboratories with in-kind contributions is also available.



Member and Associate Member Rights:

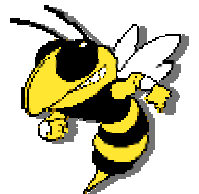
- IP resulting from research through collaborative efforts of universities, shall be owned by the participating universities.
- Nonexclusive rights to inventions shared between the center members that elect to sponsor the technology.
- Members have rights of first refusal for nonexclusive license.

IP review format:

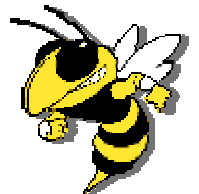
- Biannual workshops held with industrial members will review the IP generated over the past year.
- Members and associate members have 60 days to elect to sponsor IP.

Publication of results:

- University researchers shall provide at least 90 days notice of publication plans to evaluate any intended publication for purpose of IP protection.



- Date: 1:05 pm March 10 and March 17
- Location: Conf Room 295 Love Building
- 771 Ferst Drive, Atlanta, GA 30332
- Topics:
Proposed Center in Nanomanufacturing and NEMS/MEMS
Integration
Technical Slide Presentation
- For more information please contact: Prof. Hesketh at peter.hesketh@me.gatech.edu
- Phone connection in conference room is (404)385-2970



Project Pre-proposal Approval

- Program details at:
- <http://www.fbo.gov/spg/ODA/DARPA/CMO/RA06-07/Attachments.html>



Defense Advanced Research Projects Agency
3701 North Fairfax Drive
Arlington, VA 22203-1714

RA 06-07
MEMS/NEMS S&T Fundamentals

DATE: February 27, 2006

This transmission consists of one page, including lead sheet.

TECH. POC:

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This letter is in reference to your proposal abstract titled, "*Center for Nano/Micromanufacturing and Integration of MEMS/NEMS*," submitted in response to RA 06-07, MEMS/NEMS S&T Fundamentals, posted on *FedBizOpps* on 12/20/2005, requesting proposal abstracts.

Your proposal abstract was evaluated by a panel of experts in accordance with the criteria set forth in that announcement. We recommend you submit a full proposal according to the guidelines set forth in the RA 06-07 Proposer Information Pamphlet. The full proposal (original and designated number of hard and electronic copies) must be received by DARPA/MTO, 3701 North Fairfax Drive, Arlington, VA 22203-1714 (Attn.: RA 06-07) on or before 12:00 p.m., local time, Tuesday, 04 April 2006, in order to be considered for the initial phase.

Thank you for your participation in this announcement. Your efforts in expressing the concepts and plans in your proposal abstract are appreciated.

FROM: Dr. Dennis Polla
Program Manager
DARPA/MTO

FAX: 703-516-8761