

FLC

Nanoelectronics Panel

Panelists:

Eric Snow
Naval Research Laboratory

Adrian Southard
NASA-Goddard

Shashi Karna
Army Research Laboratory

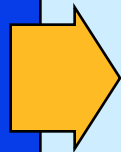
John Pettit
Pettit Applied Technologies

Panel Chair:

James C. Ellenbogen
Nanosystems Group, The MITRE Corporation

13 September 2010

Agenda for this Panel



J. Ellenbogen, MITRE **Panel Chair's 5 min. Introduction**

0 **Shashi Karna, U.S. Army Research Lab** **15 min.**

0 **John Pettit, Pettit Applied Technologies** **15 min.**

0 **Eric Snow, Naval Research Lab** **15 min.**

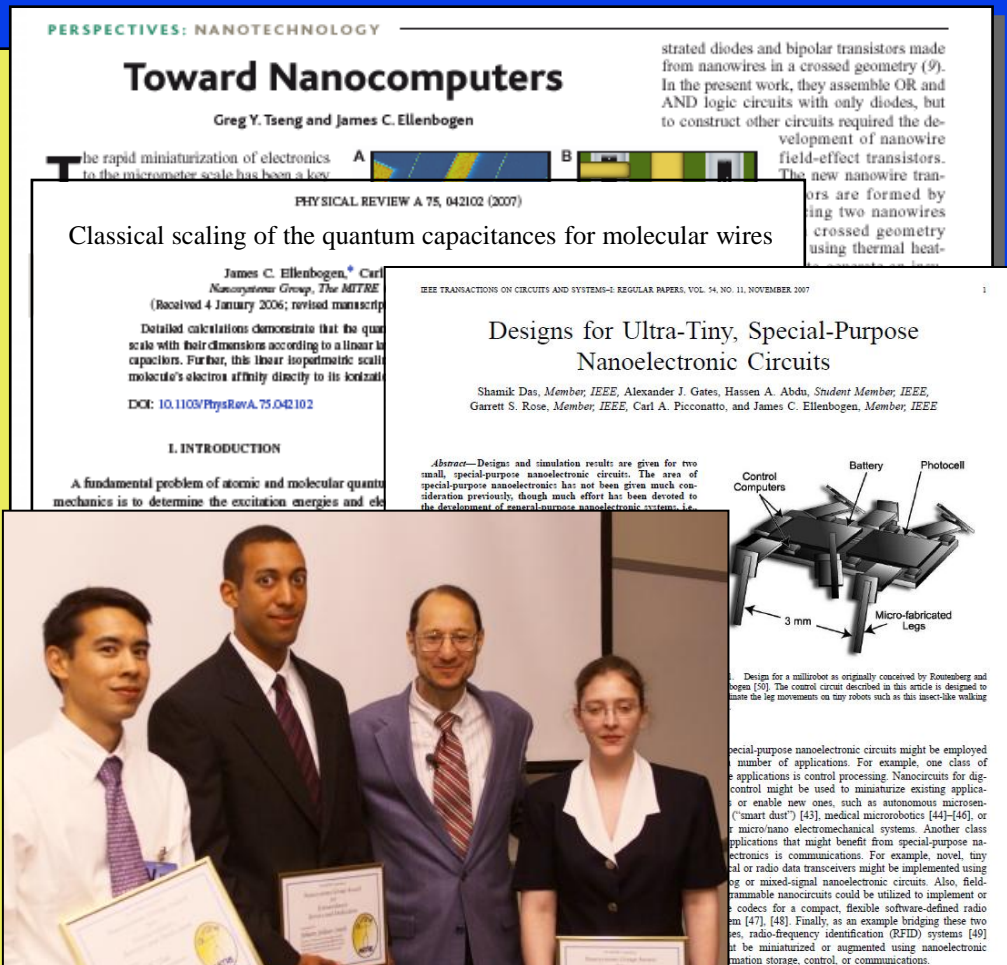
0 **Adrian Southard, NASA-Goddard** **15 min.**

What is Nanoelectronics?

- **Nanometer-scale electronic devices and circuits**
 - Where 1 nanometer = 1 billionth of a meter
~ 10 atomic diameters
 - i.e., the nanometer scale is the molecular scale
 - **Devices and circuits made from molecules, carbon nanotubes, nanowires, quantum dots, etc.**
 - **Devices and circuits made from silicon CMOS transistors that are aggressively miniaturized to the nanometer scale**
- ***Ultimately:* electronic systems built using nanometer-scale devices and integrated (or assembled) on that same scale**

MITRE Efforts & Achievements in Nanotechnology Over The Past 18 Years

- **Wide-ranging assistance to and collaboration with the Government**
 - In the planning and execution of major nanotech R&D programs
 - In performing R&D tasks on the critical path to success
- **Influential innovations in nanotechnology--key inventions, papers, patents**
- **Educating and training the nation's next generation of nanotechnologists**



**20 staff members working in MITRE's Nanosystems Group in 2010
including 8 full time senior staff and 12 summer student staff**

isoperimetric inequalities [2] in classical electrostatics.

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FIG. 1. Structures for a sequence of oligomeric polyphenylene-
ethynylene (OPE) molecular wires of increasing ring numbers n ,
and lengths L .

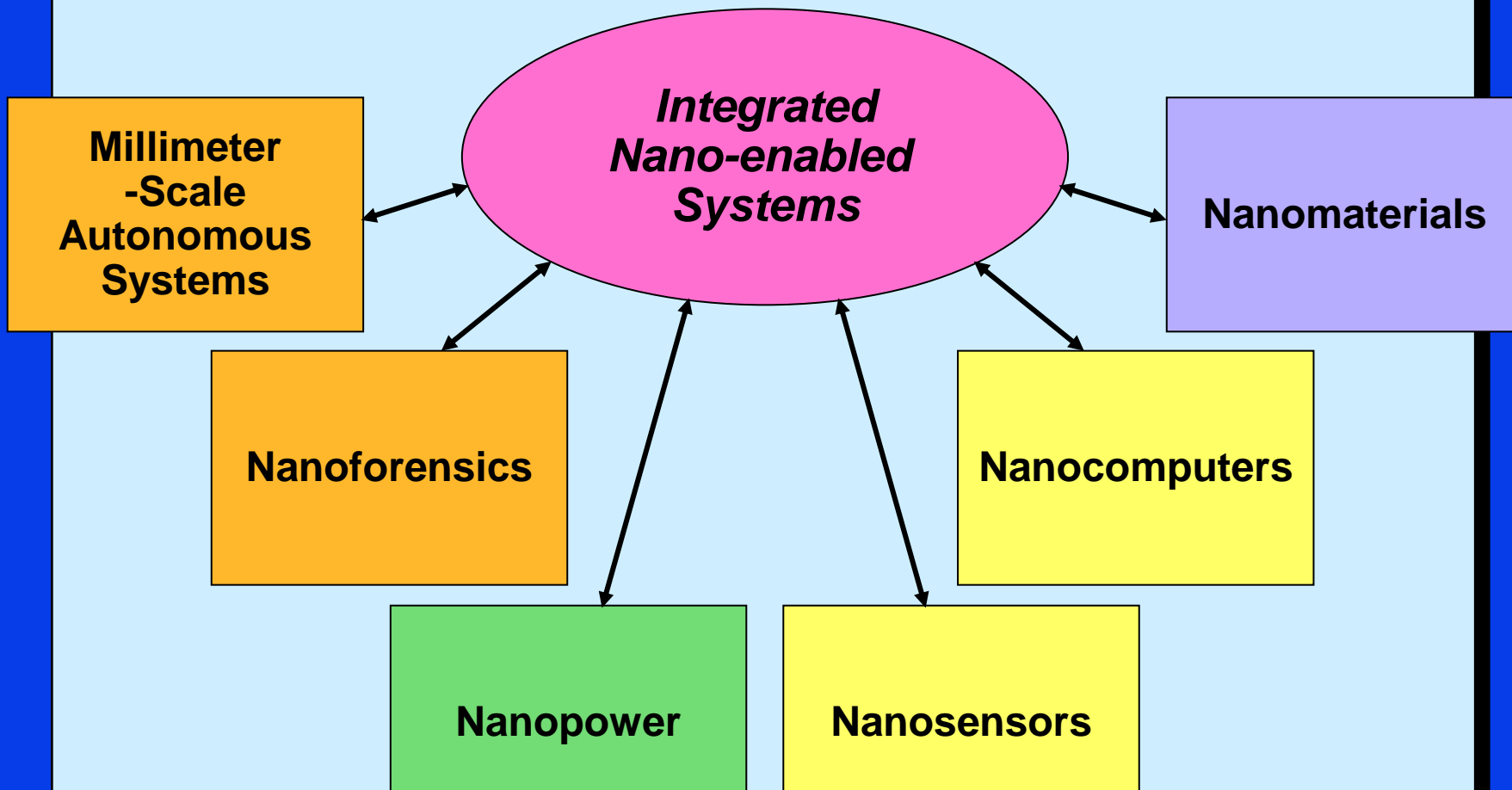
MITRE

Selected Nanotechnology Focus Areas in the MITRE Nanosystems Group

- **Nanoelectronic Circuits & Systems**
--Design, Simulation, and Prototyping
- **Nanoenabled Power Storage**
- **Nose-Like Nanosensing**
- **Millimeter-Scale Robots**
- **Nanobiotechnology for Bio-Defense**
- **Carbon Nanomaterials**
- **Multi-Scale Materials Modeling & Design**

Focus of Our Work: Integrated Nano-Enabled Systems

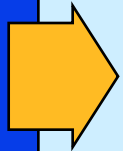
Miniaturize & lighten key elements of Govt. information systems



Includes laboratory prototyping & testing, as well as design, simulation, and program planning

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Shashi Karna, U.S. Army Research Lab 15 min.

0 **John Pettit, Pettit Applied Technologies 15 min.**

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0 **Adrian Southard, NASA-Goddard 15 min.**