10-28-2004

NanoPower Research Labs

Ryne P. Raffaelle
Rochester Institute of Technology

NanoPower Research Labs

Dr. Ryne Raffaelle
Professor of Physics and Microsystems Engineering
and Director of the NanoPower Research Labs
Rochester Institute of Technology

RIT Faculty Scholars Series
Idea Factory at Wallace Library
Thursday, October 28th, 2004
3:00 - 5:00 PM

Schol·ar

Pronunciation: 'skä-l&r
Function: *noun*
Etymology: Middle English *scoler*, from Old English *scolere* & Old French *escoler*, from Medieval Latin *scholaris*, from Late Latin, of a school, from Latin *schola* school

1 : one who attends a school or studies under a teacher **: PUPIL**
2 a : one who has done advanced study in a special field
b : a learned person
3 : a holder of a scholarship

Schol·ar·ship

Pronunciation: -"ship
Function: *noun*

1 : a grant-in-aid to a student (as by a college or foundation)
2 : the character, qualities, activity, or attainments of a scholar **:** **LEARNING**
3 : a fund of knowledge and learning <drawing on the *scholarship* of the ancients>
synonym see KNOWLEDGE

Knowl·edge

Pronunciation: 'nä-lij
Function: *noun*
Etymology: Middle English *knowlege*, from *knowlechen* to acknowledge, irregular from *knowen*

1 *obsolete* **: COGNIZANCE**

2 the fact or condition of knowing something with familiarity gained through experience or association

3 a : the sum of what is known **:** the body of truth, information, and principles acquired by mankind **b** *archaic* **:** a branch of learning

"The First in Class Strategy is to provide seed money funding in those areas in which RIT has or can build applied research competence capable of attracting significant external funding from the Federal and State governments, from industry and from foundations…"

"RIT intends to be first in that class of universities that forms real, effective, and meaningful partnerships with industry and government"

- Albert J. Simone, President RIT

First in Class Focus Areas …

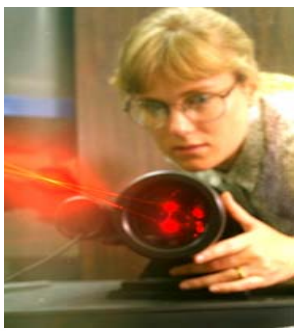
Microsystems

Imaging Arts

Alternative Energy

Deaf Education

Imaging Science



Information Technology

Biotechnology

Sustainable Systems

The IT Collaboratory

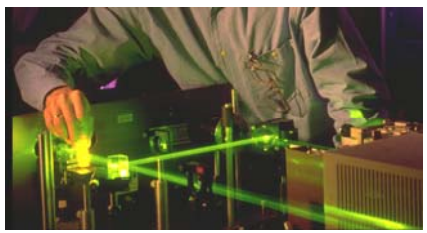
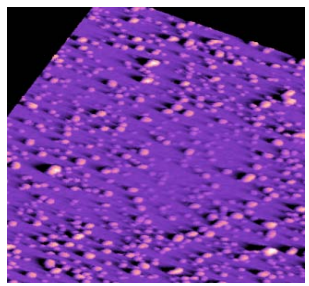
The *IT Collaboratory* was created with a grant from the New York State Office of Science, Technology, and Academic Research (NYSTAR), and is one of eight Strategically Targeted Academic Research (STAR) Centers

Mission

The *IT Collaboratory* is a is an RIT led research collaboration with the University at Buffalo and Alfred University which creates key technologies, knowledge, and capabilities to design and integrate next generation Information Technology systems.

Collaborative research is concentrated in:

Microsystems **Photonics** **Nanomaterials** **Remote Sensing Systems**

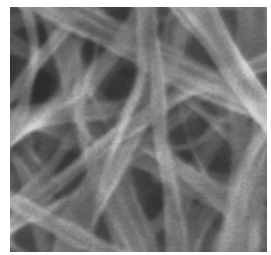





NPRL
NANOPOWER
RESEARCH LABS

Mission: To enhance the performance of energy conversion and storage devices through the development of nanomaterials.

A few examples

Higher capacity Li ion batteries through the use of high purity single wall carbon nanotubes.



More efficient photovoltaic solar cells through the use of semiconducting quantum dots.

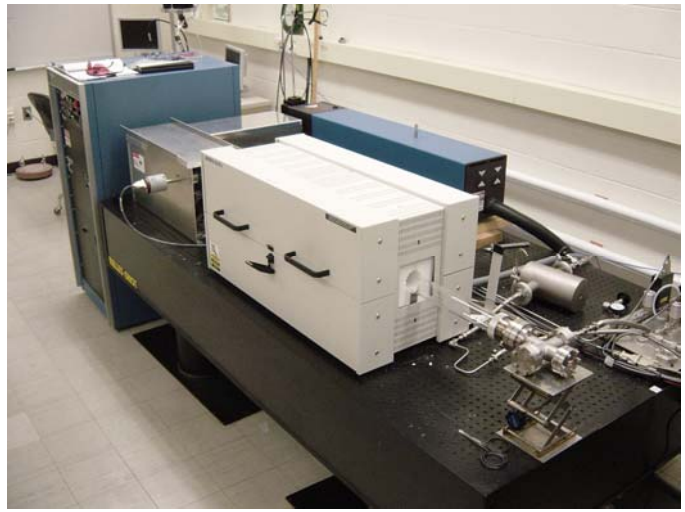
Longer life microelectronic alpha voltaic power sources using intermediate quantum dot absorbers.

R·I·T Faculty Scholars

FIRST IN CLASS

Facilities

5 labs totaling over 3850 ft^2 materials synthesis, characterization, device fabrication and testing in the Gosnell Building.



Students

Ph.D. Students
Cory Cress (Microsystems)
Brian Landi (Microsystems)
M.S. Students
Dan Byrnes (Imaging Science)
John DeFranks (Materials Science).
Jeffery Elich (Chemistry)
Chris Evans (Material Science)
Sean Houlihan (Microelectronic Eng.)
Danielle Merritt (Imaging Science)
Shellee Williams-Allen (Business Admin.)
Visiting Students
Anora Burwell (Alfred Univ)
Kathryn Chapin (Wells College)
Rebecca Perlman (Pitts. H.S.)

Undergraduate Students
Dan Brown (Microelectronics Engineering)
George Woodruf (Microelectronics Eng.)
Adam Feuer (Chemistry)
Asuka Nomura (Microelectronic Engineering)
Richard Boyer (Physics)
Doug Hastings (Elect/Mech Eng. Tech)
Cara Horbacewicz (Biochemistry)
Brad Conrad (Physics)
Peter Terrana (Microelectronic Engineering)
Chris Schauerman (Physics)
Pat Denno (Chemistry)
Nic Guggemos (Physics)
Sueda Saylan (Microelectronic Engineering)
Joanna Lucero (Physics)
Eileen Baumgartner (Graphic Design)
Brad Madajesik (Physics)

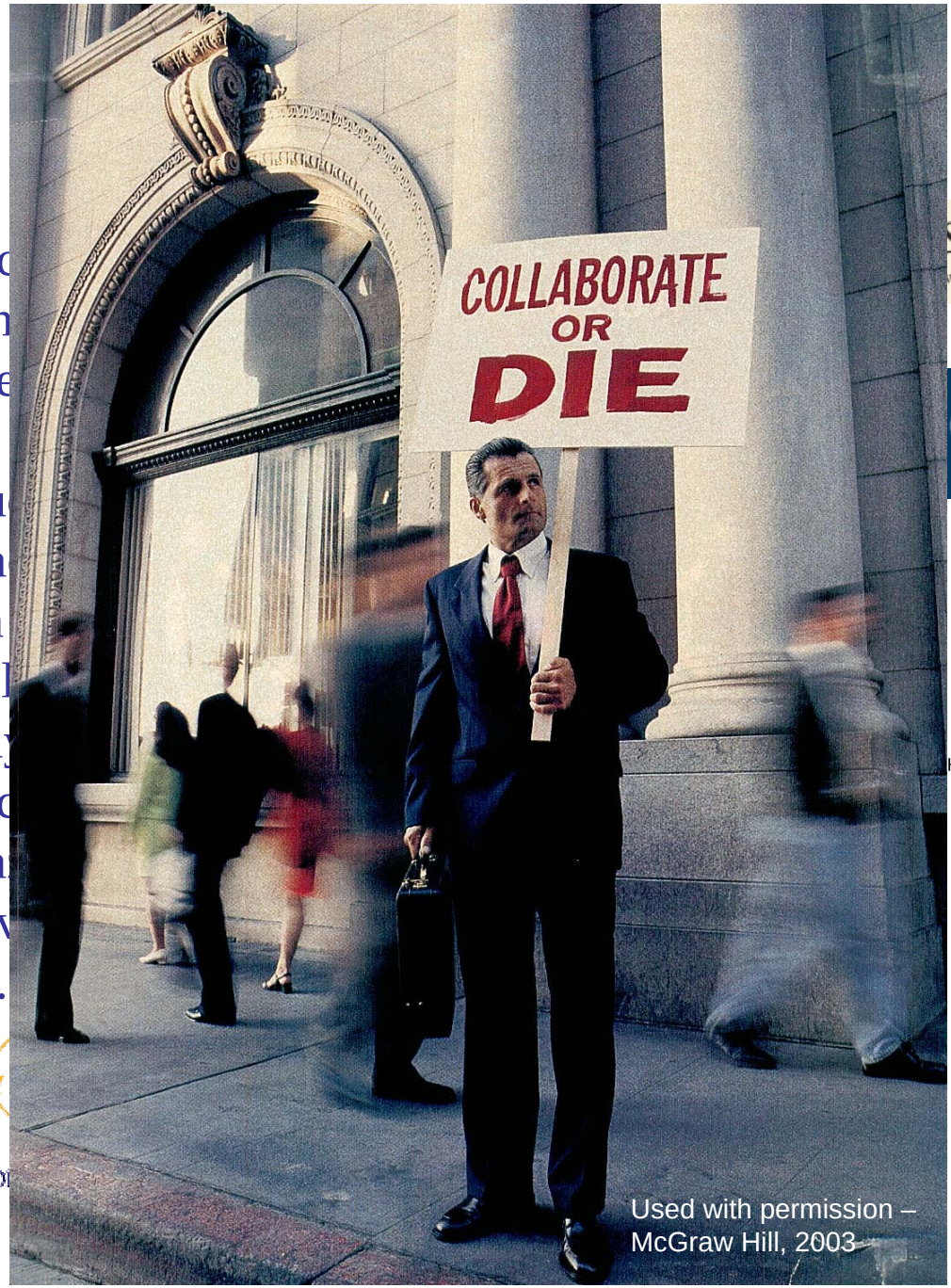
Staff

Facilities Management
William VanDerveer
Christopher Brown
Faculty
Dr. John D. Andersen (Physics)
Dr. Andy Karam (Biology)
Dr. Tom Gennett (Chemistry)
Dr. William Grande (formerly MicroEE, currently Ohmcraft, Inc.)
Dr. Brian Koberlein (Physics)
Dr. Lawretta Ononye (Physics)
Dr. Ryne P. Raffaelle (Physics)
Dr. Jerry Wagner (Physics)
Dr. Jim Worman (Chemistry)
Post-Doctoral Associates
Dr. Ronald A. Difelice
Dr. Jo Roe
Dr. Herbert Ruf

Current Programs

Quantum Dot Solar Cells (NASA)
Integrated Power Supplies (NASA)
Microelectronic Fuel Cells (DOE)
Nanomaterials for Space Solar Power (NSF)
Compact Infotonics Explorer (NYS Infotonics COE)
Carbon Nanotube Anodes for Li Ion Batteries (NASA)
Wide Bandgap Photovoltaics Development (NASA)
High Efficiency Thermionic Devices (NASA)
Scanning Tunneling Optical Resonance Microscopy (NASA)
Nanostructured Electrodes for High Energy Li Batteries (ONR)
Quantum Dot Alpha Voltaics (DARPA)
Nanomaterials and Nanostructures for Space PV (NASA)
Nanomaterls for PV (BP Solar)

Naval Researc
Ohio State Un
Essential Rese
NASA Glenn
Isotope Produ
Ohio Aerospa
Case Western
Carnegie Mell
SUNY-Albany
Naval Researc
Northwest Na
Phoenix Innov
Ohmcraft Inc.
BP Solar



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CASE
CASE WESTERN RESERVE UNIVERSITY

Phoenix
Innovation inc

Northwest Nazarene University
Great minds • Great hearts • Great futures

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CLASS

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Faculty
Scholars

Publications

Over the Past 4 Years

64 Refereed Journal and Conference Proceeding Papers!

31 of which contained Student Authors (15 as first author!)

10 of the student authors were Undergraduates!

Presentations

Microsystem Ph.D. Student and NASA Fellow Brian Landi presenting at Solar Cell 2004 in Badajoz, Spain

Nanotechnology

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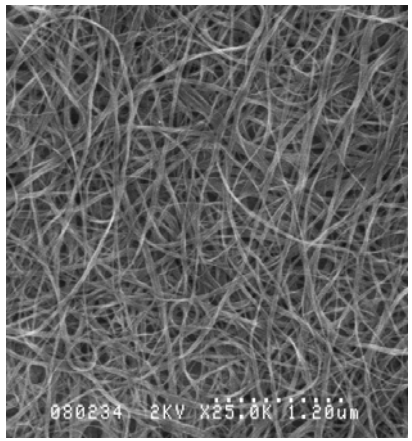
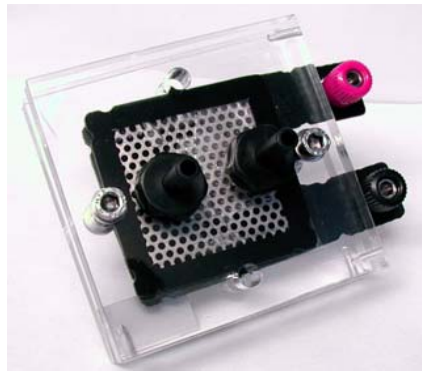
Quantum Dots

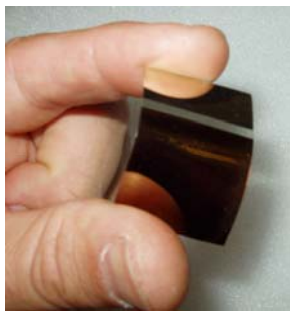
Carbon Nanotubes



Fuel Cells

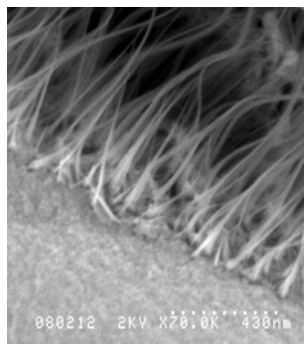


Plastic Solar Cells



Radioisotope Batteries

Emerging Technologies



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Thank You

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