

The background of the cover is a micrograph showing numerous small, circular, light-colored structures, possibly cells or viruses, scattered across a darker, textured background. The entire cover is framed by a thin orange border.

N.C. Brown Center for Ultrastructure Studies

Annual Report

2011-2012

Susan E. Anagnost, Director

Robert P. Smith, Assistant Director

<http://www.esf.edu/scme/ncb.htm>

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Cover photo:

Transmission electron micrograph of rotavirus; negative staining. Pseudo-color of grayscale image. Robert P. Smith

SUMMARY

Over sixty researchers and clients used the microscopy services provided by the NC Brown Center for Ultrastructure Studies this year. This included faculty and students at ESF, Syracuse University, Oswego, and Upstate Medical University.

The N.C. Brown Center for Ultrastructure Studies is offering a new undergraduate Minor in Microscopy beginning fall 2012. Robert P. Smith, Assistant Director, along with Dr. Susan Anagnost, Director, will teach several new courses on electron microscopy, fundamentals of microscopy and industrial and medical applications of microscopy. The N.C. Brown Center will continue to offer graduate courses in microscopy to support research at ESF and Syracuse University.

The NC Brown Center is pursuing certification of the Syracuse Asbestos Laboratory Testing Services (SALTS) Lab from NYS Department of Health. It is anticipated that revenue generated from asbestos analysis will help to upgrade and replace our microscopes and other equipment. In preparation, **Robert P. Smith** completed the NIOSH 582 Asbestos Fiber Counting Course, August 5-9, 2011 at the McCrone Research Institute, Chicago, IL. **Dr. Susan Anagnost** completed the NIOSH 582 Asbestos Fiber Counting Course Oct. 31-Nov.4, 2011 at the McCrone Research Institute, Chicago, IL.

Hwa Sung Kim, graduate student in the SCME department, won first prize at the ESF Spotlight on Research for her poster "The modification of the distribution of xylans and lignins after hot water treatment in sugar maple wood chips", authors, Hwa Sung Kim, Robert P. Smith, and Susan E. Anagnost.

Dr. Wilfred A. Côté, Professor Emeritus in the Wood Products Engineering Department, former Dean, and former Director of the N.C. Brown Center for Ultrastructure Studies, passed away on March 8, 2012.

Upstate Freshwater Institute donated film for the TEM in the amount of \$5000.

PERSONNEL

- ❖ **Susan E. Anagnost**, Ph.D., Director
- ❖ **Robert P. Smith**, M.S., M.S., Assistant Director
- ❖ **Beth Ann Arthur**, PhD. Senior Research Scientist

ACADEMIC PROGRAM

The Academic program offered by the Center is unique in central New York. Even though a number of other institutions are equipped with electron microscopes, we are the only one offering comprehensive formal training in the theory and application of these research tools.

This year we are expanding our course offerings to 4 undergraduate courses that comprise a new minor in microscopy, we have added 4 graduate level courses to meet the demand for nanoparticle research techniques, and to offer 3-credit alternatives to the 5-credit hour scanning EM and Transmission EM courses.

Courses offered in the NC Brown Center:

Undergraduate:

MCR 480 Fundamentals of Microscopy (3)
MCR 484 Scanning Electron Microscopy (3)
MCR 485 Transmission Electron Microscopy (3)

Graduate/ Advanced Undergraduate

MCR 580 Microtechnique of Wood (1-3)
MCR 585 Light Microscopy for Research Applications (3)
MCR 570 Medical and Industrial Applications of Microscopy (3)

Graduate:

MCR 680 Fundamentals of Microscopy (3)
MCR 682 Transmission Electron Microscopy for Nanoparticle Research (2)
MCR 683 Operation of the Transmission Electron Microscope (3)
MCR 685 Transmission Electron Microscopy (5)
MCR 783 Operation of the Scanning Electron Microscope (3)
MCR 785 Scanning Electron Microscopy (5)

Microscopy Minor (12 credits):

MCR 480 Fundamentals of Microscopy (3)
MCR 484 Scanning Electron Microscopy (3)
MCR 485 Transmission Electron Microscopy (3)
MCR 570 Industrial Applications of Microscopy (3)

RESEARCH 2011-12

For the year 2011-2012, the NC Brown Center for Ultrastructure Studies provided microscopy facilities and assistance to over 60 researchers including faculty and students at ESF, Syracuse University, Cornell, Upstate Medical University, and industrial clients.

PUBLICATIONS

Refereed publications:

Arthur, B. A., **Smith, R.P.**, Lavrykov S. and B.V. Ramarao. Ink penetration in uncoated paper using immuno-gold labeling: Intra-fiber diffusion and wicking. Submitted and accepted, TAPPI Paper Physics Conference, Graz, Austria, September 2011.

Presentations:

*Poster: Hwa Sung Kim, Robert P. Smith, and Susan E. Anagnost. 2012. The modification of the distribution of xylans and lignins after hot water treatment in sugar maple wood chips. Poster presentation at the SUNY-ESF Spotlight on Research, April 2012.

*This was the first prize poster at the ESF Spotlight on Research out of 52 posters.

ESF Faculty

ESF Faculty using the center

Dr. K. Limburg
Dr. S. Anagnost
Dr. J. Nakas
Dr. I. Cabasso
Dr. N. Abrams
Dr. W. Winter
Dr. C. Nomura
Dr. R. Norton
Dr. C. Whipps
Dr. B. Ramarao
Dr. Tao
Dr. S. Liu
Dr. M. Driscoll
Dr. K. Dolle
Dr. I. Gitsov
Dr. A. Weir
Dr. G. Scott

SYRACUSE UNIVERSITY

Dr. Bader
Dr. Bhatia
Dr. Braiman
Dr. Doyle
Dr. Luk
Dr. Mather
Dr. Maye
Dr. Schiff
Dr. Tavarides
Dr. Sureshkumar, (graduate student Tao Cong, PhD student)
Dr. Zhang
Dawn Higginson SU Graduate student

OTHER ACADEMIC INSTITUTIONS

Oswego -Charles Spath
Upstate Medical University- Stephan Wilkens

INDUSTRIAL CLIENTS

United Corrstack
Osmose
Benton Dickinson
Upstate Fresh Water Institute
Rawlings Adirondack Bat
Giner Electrochemical
Wyeth Vaccines

MICROSCOPE USER LOG

Transmission Electron Microscope users 7/1/2011 to 6/30/2012

1374 micrographs (# 5951-7325).

Thirty-five users:

Peter Njoiki (Maye Post Doc), SU
Wenjie Wu (Maye Grad), SU
Rabeka Alam (Maye Grad), SU
Xinfei (Winter Grad), ESF
Hyunjoo Han (Maye Grad), SU
Ryan Tappel (Nomura Grad), ESF
Corey (Maye Grad), SU
Somak Majumder, SU
Yuanzhen, Wang, SU
Hwasung Kim (Anagnost Grad), ESF
Tao (Grad),
Colleen (Dabrowiak Grad)
Yi Shi (Dabrowiak Grad)
Rob Smith (work for Matt Mark? Driscoll),
Beth Arthur (Ramarao Grad),
Rob Smith (for Liu)
Rob Smith (for Mather),
Rob Smith (for Abrams),
Rob Smith (for Ivan Gitzov),
Rob Smith (for Somak),
Rob Smith (for Bader)
Rob Smith (for Bartolini)
Rob Smith (for Lockheed)
Matthew Maye, SU
APS-Eric
Davon Slaton
Yan
Jenny
Qiong Song (Gina)
Jilei Liu, SU
Lauren Devine, ESF
Leticia Izquierdo, ESF
Yangping, Liu, SU
Rosanna Stoutenburg, ESF, ESF
Scott Bergey, FCH, ESF
Bardhyl Bajrami, PBE, ESF
Patrick Lutz, SU
Berjandi Hossein, SU
Jonathon Willow, ESF
Jessica Mastroianna, ESF
Sara Pawlak, ESF
Eric Ouellette, SU

Amir Torbati, SU
Yang Ping

Scanning Electron Microscope users 7/1/2011 to 6/30/2012

Casey/for Spencer, SU
Peter for Suresh Kumar, SU
Kristina, Gitsov, ESF
Susan Anagnost
Beth Arthur
Charles Spath, Oswego
Dr. Bhatia, SU
Matt Ali, Doelle, ESF
Jianfeng, ERE, ESF
Bardhyl Bajrami, ESF
Hunter Smith,ESF
Chen Gong, PBE, ESF
Qiong Song (Gina), ESF
Derek Zipprich
Anna for Cabasso, ESF
Gauri for Luk, SU
Robert P Smith for Gilbert , SU
RPS for Hussein, ESF
RPS for Luk, SU
Hwasung Kim, ESF
Todd for Limburg, ESF
Karboski, for Ringler, ESF
Ahn, SU
Whipps, ESF
RPS for Bartolini
RPS for Bujanovic, ESF

FACILITIES AND EQUIPMENT

Several upgrades were purchased this year; the Image Pro software upgrade with assistance from Syracuse University, and a computer upgrade in the light microscopy lab with the assistance of the SUNY Academic Equipment Replacement fund.

We have plans to repair the Beckman Airfuge, the EDAX x-ray unit for the SEM, the Balzers freeze fracture equipment, and the Cryo-Microtome.

We are planning to upgrade the electron microscopes and have toured several microscopy facilities to learn about the most modern equipment available and which instruments would be most suitable for research applications at ESF. We also are investigating several ways to finance these upgrades.

MICROSCOPES

- JEOL 2000EX, an 80-200 KV transmission electron microscope with tilt stage goniometer
- JEOL 5800 low vacuum scanning electron microscope equipped with an EDAX energy dispersive x-ray analyzer
- An array of specialized light microscopes with SPOT digital cameras. Three Nikon with fluorescence, phase contrast, Nomarski differential interference contrast, polarized light

ANCILLARY EQUIPMENT

- Leica UC6 Cryo and Resin Ultramicrotome
- Balzers T400 Rotary Shadow Freeze-Fracture Device with Glow Discharge System
- Leica Freeze Substitution Machine
- Leica Plunge Freeze Device
- Leica Automatic Grid Stainer
- Beckman Airfuge
- Sliding Microtomes
- Microtek Flat Bed Film Scanner
- ImagePro, Image J, and PhotoShop