

2013

# NC Brown Center Annual Report 2012-2013

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## Recommended Citation

Anagnost, Susan E., "NC Brown Center Annual Report 2012-2013" (2013). *N.C. Brown Center for Ultrastructure Studies*. Paper 2.  
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**N.C. Brown Center for Ultrastructure Studies**

# **Annual Report**

## **2012-2013**



Susan E. Anagnost, Director

Robert P. Smith, Assistant Director

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

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Cover photo: NC Brown Center and SALTS lab personnel: Front: Beth Arthur, Kaitlyn Smith, Susan Anagnost; Back: Taylor Rocco, Robert P. Smith, Tiffany Brookins-Little, Jeremy Sullivan

# SUMMARY

## RETROSPECTIVE

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, Upstate Medical University, and industrial clients.

Highlights of the year July 1, 2012- June 30, 2013:

- Syracuse Asbestos Testing Laboratory Testing Services (SALTS) lab accreditation, Nov 30, 2012 by NYSDOH ELAP program (NYS Lab ID No. 12002)
- SALTS Fiber Counting Course- Robert P. Smith instructed and certified the first four graduates from ESF to complete the Phase Contrast Microscopy Fiber Analysis Course: Beth Ann Arthur, Tiffany Brookins-Little, Kaitlyn Smith and Jeremy Sullivan
- A proposal was submitted February 2013 to the NSF Major Research Instrumentation Program for a new transmission electron microscope. The proposal *MRI: Acquisition of a Cryo Field Emission Transmission Electron Microscope* seeks federal financial support for the acquisition of a cryo field emission scanning transmission electron microscope (FES/TEM) to replace the current 30 year old transmission electron microscope in the NC Brown Center for Ultrastructure Studies at SUNY-ESF.
- New Class offered: Medical and Industrial Applications of Electron Microscopy as part of the new Microscopy Minor
- Offered NC Brown Ultrastructure Center expertise and services to the following businesses: United Corrstack, Lockheed Martin, Welch Allyn, Actuant Cortland Company, Ready Rubber Co, Syracuse Research Corporation, Upstate Freshwater Institute, Glantec Inspection Services, GYMO Engineering, JAG Corporation, Bronze Contracting, Watts Architecture and Engineering, Car-Freshner Corp., Winandy Associates, ABS; and more than 60 researchers (Appendix 1) from ESF, Syracuse University and Upstate Medical Hospital.
- St. John's University donated film for the transmission electron microscope in the amount of \$2000.
- Initiated FACES scheduling system for on-line log-in for ESF and outside users of the electron microscopes <http://faces.ccrcc.uga.edu/>
- Thirty-two students, faculty and industrial clients used the TEM, while twenty-six used the Scanning EM. All users were multiple users. Users of the TEM recorded 1362 images.
- Class demonstrations were provided for courses at ESF: EFB 440 Mycology, EFB 104 Intro Biology, FCH 381 Instrumental Analysis (10 lectures/demonstrations)

## PERSONNEL

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

Student Graduate Assistant Fall 2012  
Hwa Sung Kim, PhD candidate

Student Research Aide:  
Kaitlyn Smith

Student Research Assistants:  
Tiffany Brooks-Little  
Sara Pawlak

Student Work Study:  
Taylor Rocco

## 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. The NC Brown Center offers graduate and undergraduate microscopy courses as well as professional certification in fiber counting (NIOSH 582 equivalent). The four undergraduate courses compose a minor in microscopy.

### 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)

### Professional Certification:

Phase Contrast Microscopy Fiber Analysis Course (NIOSH 582-Asbestos Fiber Counting)

### Microscopy Minor:

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)

### Class Demonstrations for courses at SUNY-ESF

- Robert Smith and Beth Arthur conducted 10 lectures/demonstrations for FCH 381 Analytical Chemistry II: Spectroscopic, Chromatographic and Electroanalytical Instrumental Technique; Instructor: Mark Driscoll
- Robert Smith and Beth Arthur conducted 4 demonstrations of Scanning EM for EFB 440 Mycology; Instructor: Alex Weir
- Robert Smith conducted a lecture/demonstration for EFB 104 General Biology II Laboratory (Neil Abrams and Greg McGee)

## RESEARCH 2012-13

ESF and SU users of the NC Brown Center microscopes generated Masters and PhD dissertations and research publications which are not included here.

### PUBLICATIONS (CENTER STAFF)

Wendong Tao, Yuling He, Ziyuan, Wang, **Robert P. Smith**, Walid Shayya, Yuansheng Pei. 2012. Effect of pH and temperature on coupling nitrification and anammox in biofilters treating dairy wastewater. *Ecological Engineering*. 47:76-82.

Kim, Hwasung. 2012. Microscopic Evaluation of the Cell Wall in Sugar Maple Chips after Hot Water Treatment and Fungal Decay, PhD dissertation, SUNY-ESF, Major Professor, S.E. Anagnost.

### In progress:

Kim, Hwasung, Smith, Robert P. and S. E. Anagnost. Immunogold localization of xylan and syringyl lignin in sugar maple following hot water extraction.

Kim, Hwasung and S. E. Anagnost. Changes in fungal degradation patterns of sugar maple chips following hot water extraction.

### GRANT PROPOSALS

Anagnost, Susan E., Gitsov, I.I, and Smith, R.P. *MRI: Acquisition of a Cryo Field Emission Transmission Electron Microscope*. NSF Major Research Instrumentation Program. \$1,100,000. Submitted February, 2013.

## RESEARCHERS USING THE FACILITIES

For the year 2012-2013, the NC Brown Center for Ultrastructure Studies provided microscopy facilities and assistance to over 60 researchers including faculty and students at ESF, Syracuse University, Upstate Medical University, and industrial clients (Appendix 1).

### ESF FACULTY

Dr. N. Abrams  
Dr. T. Amidon  
Dr. S. Anagnost  
Dr. B. Bujanovic  
Dr. I. Cabasso  
Dr. M. Driscoll  
Dr. I. Gitsov  
Dr. K. Limburg  
Dr. S. Liu  
Dr. J. Nakas  
Dr. C. Nomura  
Dr. B. Ramarao  
Dr. Tao  
Dr. A. Weir  
Dr. C. Whipps  
Dr. W. Winter

### SYRACUSE UNIVERSITY FACULTY

Dr. Bader  
Dr. Bhatia  
Dr. Doyle  
Dr. Luk  
Dr. Mather  
Dr. Maye  
Dr. Korendovich  
Dr. Sureshkumar

### UPSTATE MEDICAL UNIVERSITY

Dr. Stephan Wilkens

### ESF Graduate Students

Hwasung Kim (Major Professor Susan Anagnost)  
Qiong Song (Gina), PBE, ESF  
Hunter Gray, Chemistry, ESF  
Jeremy Hayward, EFB, ESF  
Dieter Scheibel, Chemistry, ESF  
Jeremy Sullivan, Chemistry, ESF  
Xin Liu, Chemistry, ESF  
Andrew Palm, SCME, ESF



Miriam Israelowitz, EFB, ESF  
Joannah Fine, ESF  
Rosanna Stoutenbuerg, EFB, ESF

Syracuse University Graduate Students

Wenjie Wu (Maye Grad), SU  
Rabeka Alam (Maye Grad), SU  
Hyunjoo Han (Maye Grad), SU  
Corey Hine (Maye Grad), SU  
Somak Majumder, SU  
Cara Rufo (Dr. Korendovich)  
Davon Slayton ((Maye)

INDUSTRIAL CLIENTS

Actuant Cortland  
Bronze Contracting  
Car-Freshner Corp.  
Glantec Inspection Services  
Gymo Engineering  
JAG Corporation  
Jerry Winandy Associates  
Lockheed Martin  
Ready Rubber Co.  
Syracuse Research Corporation  
United Corrstack  
Upstate Fresh Water Institute  
Watts Engineering and Architecture  
Welch Allyn



## SYRACUSE ASBESTOS LABORATORY AND TESTING SERVICES

NYS LAB ID No. 12002

On November 30 2012, the Syracuse Asbestos Laboratory and Testing Services, (SALTS), was awarded certification by NYS Department of Health as an official testing lab for airborne asbestos using the Fiber Counting method (NIOSH 7400). The SALTS Lab has been designated as NYS Lab ID No. 12002 (Appendix 2).

Dr. Beth Arthur was instrumental in preparing the application to NYS Department of Health and leading the staff through two successful inspections in November 2012 and April 2013.

SALTS clients include:

- Glantec Inspection Services
- Gymo
- JAG
- Bronze Contracting
- Watts Engineering and Architecture

Dr. Beth Arthur attended the PACNY Conference in February, 2013. As a result, contacts were made with industrial clients which generated business with Gymo, JAG, Bronze Contracting, and Watts Engineering and Architecture.

During the start-up phase, from January 2013 through June 2013, the SALTS lab generated \$9,800.00 in revenue for the NC Brown Center, with \$2000.00 pending for the balance of June, 2013 (as of June 28, 2013).

SALTS is actively seeking clients with plans to expand to TEM asbestos analysis in 2014/2015 with possible acquisition of a new transmission electron microscope.

Robert P. Smith, Lead Technical Director of SALTS, taught the Fiber Counting Method (NIOSH 582 equivalent) course to five students. These students are now certified asbestos analysts (PCM method).

SALTS hired two students, Kaitlyn Smith and Tiffany Brooks to assist with sample analysis and reporting. In addition to Kaitlyn and Tiffany, Taylor Rocco and Jeremy Sullivan assisted in the laboratory during the spring semester.

## FACILITIES AND EQUIPMENT

A proposal was submitted February 2013 to the NSF Major Research Instrumentation Program for a new transmission electron microscope. The proposal *MRI: Acquisition of a Cryo Field Emission Transmission Electron Microscope* seeks federal financial support for the acquisition of a cryo field emission scanning transmission electron microscope (FES/TEM) to replace the current 30 year old transmission electron microscope in the NC Brown Center for Ultrastructure Studies at SUNY-ESF.

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

We have acquired and equipped three phase contrast light microscopes with the specifications for asbestos fiber counting (NIOSH 7400 counting rules A)

### *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
- Phase contrast light microscopes for fiber counting (NIOSH 7400 Counting Rules A)

### *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

# APPENDIX 1. MICROSCOPE USER LOG

## **Transmission Electron Microscope users 7/1/2012 to 6/30/2013**

1362 micrographs (# 7326-8688).

### Thirty-two users:

Wenjie Wu (Maye Grad), SU  
Rabeka Alam (Maye Grad), SU  
Hyunjoo Han (Maye Grad), SU  
Corey (Maye Grad), SU  
Somak Majumder, SU  
Hwasung Kim (Anagnost Grad), SCME, ESF  
Beth Arthur, NC Brown Center, ESF  
Rob Smith, NC Brown Center (for Bader), SU  
Rob Smith (for Gitsov), ESF  
Rob Smith (for Luk), SU  
Rob Smith (for Christina),  
Rob Smith (for Rosanna)  
Rob Smith (for Spencer)  
Sara Pawlak, Environmental Science, ESF  
Qiong Song (Gina), PBE, ESF  
Dr. Korendovich, SU  
Hunter Gray, Chemistry, ESF  
Matt Cleere, ESF  
Jeremy Hayward, EFB, ESF  
Dieter Scheibel, Chemistry, ESF  
Jeremy Sullivan, Chemistry, ESF  
Xin Liu, Chemistry, ESF  
Andrew Palm, SCME, ESF  
Miriam Israelowitz, EFB, ESF  
Cara (for Dr. Korendovich), SU  
Davon Slayton (for M Maye) SU  
Joannah Fine, ESF  
Rosanna Stoutenbuerg, EFB, ESF  
Tagbo (for Ren), SU  
Pat (for M. Maye), SU  
Joel Howard/ABS, Industry

## **Scanning Electron Microscope users 6/1/2012 to 6/1/2013**

The scanning electron microscope had twenty-six users, 7/1/2012 to 6/30/2013

Beth Arthur (Mark Driscoll class; Alex Weir class), ESF  
Rob Smith (for Dr Zhang, ME Dept), SU

Rob Smith (Mark Driscoll class), ESF  
Rob Smith (for Liu,), SU  
Rob Smith (for Bhatia), SU  
Rob Smith (Actuant) Industry  
Rob Smith (Bartolini)  
Rob Smith (for Car-Freshner), Industry  
Xinfei (for Winter), ESF  
Sue Anagnost (work for Freeman), Industry  
Abrams, ESF  
Hwasung Kim (Anagnost Grad and GA for SEM class), ESF  
Bhatia (Bhatia), SU  
Claudia (J. Smith), ESF  
(Welch Allyn), Industry  
Levine (Nomura), ESF  
Jesse Taylor (SRC), Industry  
Qiong Song (Gina) (Amidon), ESF  
Prajakta Dongra. ESF  
Hunter Gray, Chemistry, ESF  
Neil Kohan, SCME, ESF  
Andrew Palm, SCME, ESF  
Sara Pawlak, Envir. Sci., ESF  
Xin Liu, Chemistry, ESF  
Deiter Scheibel, Chemistry, ESF  
Jeremy Sullivan, Chemistry, ESF


**Light Microscopy Industry Projects July 1 2012-June 30, 2013**

(not including Asbestos)

Beth Arthur (for United Corrstack)  
Susan Anagnost (for Car Freshner)  
Susan Anagnost (for Winandy Associates)

# APPENDIX 2. ELAP CERTIFICATE FOR APPROVAL

**NEW YORK STATE DEPARTMENT OF HEALTH**  
**WADSWORTH CENTER**



Expires 12:01 AM April 01, 2013  
Issued November 30, 2012

**CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE**  
*Issued in accordance with and pursuant to section 502 Public Health Law of New York State*

**MR. ROBERT P. SMITH**  
**SYRACUSE ASBESTOS LABORATORY TESTING SERVICES**  
**SUNY-ESF, 243 BAKER LAB ONE FORESTRY DRIVE**  
**SYRACUSE, NY 13210**

NY Lab Id No: 12002

*is hereby APPROVED as an Environmental Laboratory for the category*  
**ENVIRONMENTAL ANALYSES AIR AND EMISSIONS**  
*All approved subcategories and/or analytes are listed below:*

**Miscellaneous Air**

**Fibers**                      **NIOSH 7400 A RULES**

Serial No.: 47738

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

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