

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>

salts@esf.edu

CONTENTS

Summary.....	2
Retrospective.....	2
Personnel.....	3
Academic Program.....	4
Research 2012-13.....	5
Publications (Center staff).....	5
Grant Proposals.....	5
Researchers Using the Facilities.....	6
Syracuse University Faculty.....	6
Upstate Medical University.....	6
Industrial Clients.....	7
Syracuse Asbestos Laboratory and Testing Services.....	8
NYS Lab ID No. 12002.....	8
Facilities and Equipment.....	9
Microscopes.....	9
Ancillary equipment.....	9
Appendix 1. Microscope User Log.....	10
Appendix 2. ELAP Certificate for Approval.....	12

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.ccruc.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.

Page 1 of 1