

Andrea Blake Brothers

Employment

Instrumentation: PLM (polarized light microscopy), HSM (hot stage microscopy), (S)TEM (scanning transmission electron microscopy), SEM (scanning electron microscopy), Dual Beam FIB/SEM (focused ion beam microscopy), EDS (energy dispersive spectroscopy), EELS (electron energy loss spectroscopy), FT-IR (Fourier-transform infrared spectroscopy), FT-Raman (Fourier-transform Raman spectroscopy), Fluorescence and Confocal Laser Scanning Microscopy

Expertise: Ultramicrotomy, biological TEM, critical point dehydration, and metals evaporation for RT and cryo biological TEM and SEM applications, FIB/SEM prep for materials and semiconductor lamella (S)TEM samples, formulation and characterization of pharmaceutical product using PLM, HSM, FT-IR/FT-Raman, and SEM with EDS, and imaging, image analysis and elemental analysis (EFTEM, EELS) techniques

**May 2010-
Present** AB Brothers Microscopy, Manassas, VA
Microscopy Consulting Services

President

- Provide electron microscopy images and spectral analysis data for clients by using area facilities
- Outreach involvement in area schools by donating time and equipment related to microscopy education

**Jan 2019-
June 16, 2025** American University, Washington, DC
Chemistry Department in College of Arts and Science

Instrument Coordinator & Microscopy Core Manager

- Provide equipment training, scheduling and maintenance for sophisticated teaching and research instrumentation
- Collaborate with faculty on research projects where characterization is a key intellectual element
- Develop and implement protocols/practices to insure that major instruments and accessories function properly

**Oct 2017-
Apr 2018** Tescan USA, Warrendale, PA
Applications & Sales Support

Applications Specialist

- Provide sample analyses for potential customers using SEM & FIB-SEM microscopes
- Perform demonstrations on SEM and FIB-SEM instrumentation for potential customers
- Offer post-sales support to customers needing assistance with operation of instruments and sample preparation

**Feb 2017-
Aug 2017** The George Washington University, Washington, DC
Nanofabrication and Imaging Center

Laboratory Associate

- SEM, (S)TEM, and TEM sample preparation, imaging, and elemental analysis evaluation of all project samples
- Train users for the above techniques as assistance in the Nanofabrication and Imaging Center
- Manage (S)TEM, SEM, and FIB/SEM laboratory: stock supplies, prepare reagents, design and perform experiments

**April 2012-
July 2016** Micron Technology, Manassas, VA
Yield Enhancement Laboratory

TEM Engineer

- Dual beam (SEM/FIB) ion milling operation for TEM preparation of semiconductor devices to enhance product yield
- SEM, (S)TEM, and TEM sample preparation, imaging, and elemental analysis evaluation of semiconductor device products

**Jan 2011-
Apr 2012** Howard Hughes Medical Institute Janelia Farm Research Campus, Ashburn, VA
Electron Microscopy Shared Resource Facility

Research Specialist

- Team member on "Fly EM" *Drosophila* brain reconstruction project
- Operator of 3 TEMs to image serial sections using proprietary tomography software for stage control and digital capture

Employment (contd.)

- Oct 1990-
Jan 2011** Biovail Technologies Ltd. (Canadian pharmaceutical company, formerly Fuisz Technologies), Chantilly, VA, merged with Valeant Pharmaceuticals in 2010, resulting in shutdown of Chantilly, VA site and layoff of 50+ employees
Microscopy & Microanalysis Characterization Center
Sr. Scientist, Microscopy
- Worked closely with Formulators and Chemists using microscopy data to help them visualize products and processes
 - Produced, reviewed, and approved data, micrographs, results, and interpretations of findings for staff scientists
 - R & D work for characterizing and formulating API's into oral dosage forms, often with increased bio-availability
 - Trained scientists in sample preparation for and operation of PLM, HSM, SEM, EDS and FT-IR Microspectroscopy
 - Provided global technical microscopy support for 4 sites, including Process Development and Manufacturing
 - Co-invented the core technology, including MicroSphere®, FlashShear® and FlashDose® products
 - Verified claims for Legal concerning technical issues and provided micrographs and data for patent applications
 - Developed specific techniques in Microscopy and Microanalysis for characterizing new and unique products
 - Correlated microscopy results with data from complementary techniques (pXRD, DSC, ERH *etc.*)
 - Designed and created company's first technical brochure, using micrographs to describe the technology
 - Managed special projects, such as PR campaigns, whenever any technical imaging services were requested
- Feb 1981-
Oct 1990** Georgetown University, Washington, DC
Department of Biology
Research Assistant
- Assisted ~2-3 professors per year with the TEM sample preparation and imaging portion of research projects
 - Instructed ~6-8 undergraduate and graduate students per semester in TEM techniques and histology courses
 - Managed TEM laboratory: stocked supplies, prepared reagents, scheduled, designed, and performed experiments
 - Performed all phases of black and white darkroom work; provided interpretation for micrographs
- Aug 1979-
Feb 1981** University of South Carolina Medical School, Columbia, SC
Pathology Department
Electron Microscopy Laboratory
Laboratory Manager
- Assisted 2 research physicians with TEM techniques (ultramicrotomy and freeze fracture) for research projects
 - Instructed ~ 4-6 medical students per semester in TEM and SEM techniques courses
 - Managed TEM and SEM laboratory: stocked supplies, prepared reagents, scheduled, designed, and performed experiments
 - Performed all phases of black and white darkroom work; provided interpretation for micrographs

Education

- Aug 1975-
Aug 1979** **University of South Carolina**
B.S. Biology
- Dec 1984-
May 1988** **Georgetown University**
15 graduate credit hours
Biology

Consulting

- Aug 1988-
May 2010** Smithsonian Institution, Washington, DC
National Museum of Natural History
Department of Invertebrate Zoology
- Ultramicrotomy and TEM for various samples (sponge, feather, pollen, algae, *etc.*) which resulted in 7 technical publications
 - Routine maintenance for TEM and ancillary equipment

Publications

- MAC MAHON, D.J., BROTHERS, A.B., FLORENT, K., KURINEC, S. "Layered Structure of MoS₂ Investigation using Electron Energy Loss Spectroscopy". *Materials Letters*, 161: 96-99, 2015.
- IVES, J.A., MOFFETT, J.R., ARUN, P., LAM, D., TODOROV, T.I., BROTHERS, A.B., ANICK, D.J., CENTENO, J., NAMBOODIRI, M.A.A., JONAS, W.B. "Enzyme Stabilization by Glass-derived Silicates in Glass-exposed Aqueous Solutions". *Homeopathy*, 99: 15-24, 2010.
- WILLIAMS, R.H., CHAPMAN, G.B., and BLAKE, A.S. "Ultrastructural Study of the Blood Cells of the Beluga Whale, *Delphinapterus leucas*". *Journal of Morphology*, 209: 97-110, 1991.
- CHAPMAN, G.B., SMITH, C.W., and BLAKE, A.S. "Observations on the Multitubular Pod Inclusions of the Granular Hemocytes of the Cockroach *Periplaneta americana*". *Americal Microscopical Society, Inc.*, 109 (2): 168-173, 1990.
- BLAKE, A.S., HILL, B. F., WATSON, S.C., and CHAPMAN, G.B. "Changes in Cell Surface Area and Cell Volume during Encystment and Excystment in *Euplotes iliffei* (Ciliophora: Hypotrichia)". *Transactions of the American Microscopical Society*, 108 (1): 108, 1989.
- BLAKE, A.S., BLANQUET, R.S., and CHAPMAN, G.B. "Fibrillar Ultrastructure of the Capsular Wall and Intracapsular Space in Developing Nematocysts of *Aiptasia pallida*". *Transactions of the American Microscopical Society*, 107 (3): 217-231, 1988.
- BARROWS, E.M., CHAPMAN, G.B., ZENEL, J.E., and BLAKE, A.S. "Ultrastructure of Dufour's Glands in Active and Inactive Hornfaced Bees, *Osmia cornifrons* (Hymenoptera: Megachilidae)". *Journal of the Kansas Entomological Society*, 59 (3): 480-493, 1986.
- BLAKE, A.S. and WATABE, N. "Examination of Normal Mantle of *Pomacea paludosa* with and without Pyroantimoniate". *South Carolina Academy of Science Bulletin*, 38: 92, 1975.

Patents

- "System for Rendering Substantially Non-Dissoluble Bio-Affecting Agents Bio-Available". # 6,391,338; 5-21-02
- "Method of Preparing Mesomorphic Sugar Products". # 6,132,797; 10-17-00
- "Mesomorphic Sugar and Products Therefrom". # 5,876,506; 3-2-99.
- "Entrapping Additives in Carbohydrate Bodies". # 5,874,110; 2-23-99.

Skills

- Excellent verbal and written communication skills; highly organized with respect to carrying out projects
- Quick to learn new techniques and implement them for practical applications
- Demonstrated strong interpersonal and collaborative ability with diverse groups of colleagues
- Ability to analyze data, determine root cause deficiencies, and provide useful recommendations for resolution
- Manage multiple priorities and tasks in a dynamic environment

Interests

- Play violin and serve as Board Member with the Manassas Symphony Orchestra (Fall 2003; Spring 2016 – Present)
- STE(A)M initiatives volunteer work designed to instruct area students how to use a microscope to solve problems