**Andrea Blake Brothers**

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# 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)*

***Expertise:*** *Ultramicrotomy, 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-** AB Brothers Microscopy, Manassas, VA

**Present** 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-** American University, Washington, DC

**Present** Chemistry Department

### Instrument Coordinator

* 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-** Tescan USA, Warrendale, PA

**Apr 2018** 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-** The George Washington University, Washington, DC

**Aug 2017** 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-** Micron Technology, Manassas, VA

**July 2016** 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-** Howard Hughes Medical Institute Janelia Farm Research Campus, Ashburn, VA

**Apr 2012** 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-** Biovail Technologies Ltd. (Canadian pharmaceutical company, formerly Fuisz Technologies), Chantilly, VA, merged with

**Jan 2011** 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

|  |  |  |  |
| --- | --- | --- | --- |
|  | ● | Developed specific techniques in Microscopy and Microanalysis for characterizing new and unique products |  |
|  | ● | 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-** Georgetown University, Washington, DC

**Oct 1990** 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-** University of South Carolina Medical School, Columbia, SC

**Feb 1981** 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- University of SouthCarolina Aug 1979 *B.S. Biology***

**Georgetown University**

**Dec 1984- *15 graduate credit hours***

**May 1988 *Biology***

# Consulting

**Aug 1988-** Smithsonian Institution, Washington, DC

**May 2010** 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,

* 1. “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 Mesomorphoic 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