Audrey FORTICAUX

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QUALIFICATION SUMMARY

- Comprehensive knowledge of hard inorganic and nanomaterials synthesis, characterization, and applications
- Expert in nanomaterials imaging and characterization: electron microscopies, including STEM and cryo-TEM, X-ray and electron diffraction, and atomic force microscopy (AFM)
- Highly proficient in soft materials synthesis and characterization from peptides to polymers
- Strong leadership skills: instrument manager (maintenance, training, repairs), lab safety officer, and event planner for the whole department and research group during graduate research
- Effective team worker and mentor with excellent written and oral communication skills

EDUCATION

2010-present **University of Wisconsin – Madison, Ph. D. Materials Chemistry** (Anticipated January 2015)
Advisor: Prof. Song Jin
Thesis: Tailoring the screw dislocation-driven growth of nanomaterials and their heterostructures towards complex architectures

2007-2012 **Graduate school of Chemistry and Chemical Engineering, CPE Lyon, France**
M.S. (Diplôme d'Ingénieur) April 2012
B.S. January 2009
Core subjects: organic and analytical chemistry, and process engineering;
Elective: analytical strategies, polymer materials and macromolecular structure, catalysis and sustainable development, from the molecule to nanomaterials, and chemical engineering for polymerization

RESEARCH ACHIEVEMENTS

2010-present **Rational Screw Dislocation-Driven (SDD) Growth of 2-Dimensional Nanomaterials, Graduate Research, Department of Chemistry, University of Wisconsin – Madison**

- Successfully synthesized complex 3D nanomaterial architectures in solution by tailoring their SDD crystal growth mechanism; e.g. using nanoplates as seeding source to grow nanowire arrays, 3D mesoscale p-n junction diodes were obtained for the first time.
- Devised fundamental theory for ongoing demonstration of morphological control of SDD grown 2D nanoplates using molecules, such as peptides, and nanoclusters; collaboration with Prof. S. Gellman, Dept. Chem.
- Performed microscopic imaging of collagen-like fibers to use as versatile templates for tailored nanoassembly of semiconductors; collaboration with Prof. R. Raines, Dept. Biochem.

2009-2010 **Intern Scientist, International Paint - Akzo Nobel, Fire Protection Dept, Gateshead, UK**
Developed formulations for intumescent paint with an alternative resin system to provide preliminary results for new patent

- Paint formulation, manufacture, and application on panels and beams; paint analyses: fire test (turbulent and jet fire), environmental stability (humidity, UV resistance), storage stability (viscosity)
- Gained tremendous experience in industrial practices

Spring 2009 **Laboratory of Chemistry and Process engineering for Polymerization, CPE Lyon, France**
Synthesized new Ziegler-Natta catalysts for copolymerizing ethylene and 1-hexene

- Advisor: Vincent Monteil
- Inert atmosphere synthesis, liter scale polymerization, and analysis experience (GPC and TREF)

Summer 2008 **REU, Department of Materials Science, Northwestern University, Evanston, IL**
Successfully prepared calcium cobaltite by thermoreversible gelcasting for thermoelectrics

- Advisor: Prof. Katherine Faber, Mentor: Noah O. Shanti
- Analyses: XRD, flash diffusivity, electrical resistance, Seebeck coefficient, and density measurements

TECHNICAL EXPERTISE

Synthesis/Preparation Solution and gas phase synthesis and modification of inorganic nanomaterials, peptide and polymer synthesis

Characterization *Primary skills:* AFM contact/tapping imaging, current-sensing and fluid AFM; electron microscopies: SEM, TEM, cryo-TEM, STEM; energy dispersive X-ray spectroscopy, electron and X-ray diffraction; *Secondary skills:* electrical measurements (probe station), small angle X-ray scattering, HPLC, MALDI-TOF, DSC, TGA, MLC, IR, UV-Vis, ICP-AES

Software Microsoft Office, Photoshop, Crystallography software (Diamond, JADE, JEMS etc.)

HONORS AND AWARDS

April 2014 Poster Presentation Gold Award for the Symposium RR "Solution Synthesis of Inorganic Functional Materials" and Best Poster Nominee (all symposia) at the Materials Research Society 2014 Spring Meeting

April 2014 First Place Science as Art at the Materials Research Society 2014 Spring Meeting

2013-2014 Why Files Cool Science Images competition winner 2 consecutive years

OUTREACH, LEADERSHIP, AND TEACHING ACTIVITIES

2011-2014 Public outreach activities *via* the Nanoscale Science and Engineering Center (NSEC), UW-Madison

2012-2014 Materials Chemistry student representative at the Graduate Student Faculty Liaison Committee, Dept. of Chem., UW-Madison; Helped refine the Materials path, organized charity fundraisers and other events

Fall 2013 Expand Your Horizons: 1-day event to promote women in STEM fields; AFM demo for PEOPLE Program; Poster presentation for CHOPS, Dept. of Chem., UW-Madison

2011-2013 Mentored two undergraduate students

Fall 2010 Teaching assistant for Gen. Chem. 103, Dept. of Chem., UW-Madison; 40 students

2010-present REACH program, UW-Madison, to promote the French culture and language in the US

2008-2009 Chemistry student representative, CPE Lyon, France

AFFILIATIONS

2014-present Member of the Materials Research Society (first membership: 2011 to 2012)

2013-present Member of the American Chemical Society

2011-2014 Member of Thrust 2 – NSEC, UW-Madison, NSF funded

PUBLICATIONS

6) M. A. Lukowski, A. S. Daniel, C. R. English, F. Meng, A. Forticaux, R. J. Hamers, and S. Jin; Highly Active Hydrogen Evolution Catalysis from Metallic WS_2 Nanosheets. *Energy Environ. Sci.,* **2014**, Advance Article DOI: 10.1039/C4EE01329H.

5) F. Meng, M. Estruga, A. Forticaux, S. A. Morin, Q. Wu, Z. Hu, and S. Jin; Formation of Stacking Faults and the Screw Dislocation-Driven Growth: A Case Study of Aluminum Nitride Nanowires. *ACS Nano*, **2013**, 7, 11369-11378.

4) A. Forticaux, S. Hacialioglu, J. P. DeGrave, R. Dziedzic, and S. Jin; Three-Dimensional Mesoscale Heterostructures of ZnO Nanowire Arrays Epitaxially Grown on $CuGaO_2$ Nanoplates as Individual Diodes. *ACS Nano* **2013**, 7, 8224-8232.

3) M. A. Lukowski, A. S. Daniel, F. Meng, A. Forticaux, L. Li, and S. Jin; Enhanced Hydrogen Evolution Catalysis from Chemically Exfoliated Metallic MoS_2 Nanosheets. *J. Am. Chem. Soc.* **2013**, 135, 10274-10277.

2) F. Meng, S. A. Morin, A. Forticaux, and S. Jin; Screw Dislocation Driven Growth of Nanomaterials. *Acc. Chem. Res.* **2013**, 46, 1616-1626.

1) S. A. Morin, A. Forticaux, M. J. Bierman, and S. Jin; Screw Dislocation-Driven Growth of Two-Dimensional Nanoplates. *Nano Lett.* **2011**, 11, 4449-4455.

PRESENTATIONS AND POSTERS

3) *Screw Dislocation-Driven Growth of Nanomaterials Tailored by Molecules and Heterostructures*; Poster presentation at the Materials Research Society Spring Meeting 2014
Trip partially funded by a Vilas Travel Grant, UW-Madison

2) *A Platform to Study Screw Dislocation-Driven Crystal Growth: Functional Inorganic Nanoplates and Their Heterostructures*; Gordon Research Conference (poster) and Seminar (talk) - Thin Film and Crystal Growth; July 2013
Trip partially funded by a Graduate Student Faculty Liaison Committee Travel Grant, Dept. of Chem., UW-Madison

1) *The Influence of Biomolecules on the Dislocation-Driven Growth of 2D Nanoplates*; Oral presentation at the Materials Research Society Fall Meeting 2011