Joy C. Perkinson

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Education

Massachusetts Institute of Technology Cambridge, MA
B.S. in Materials Science and Engineering, June 2009.

Coursework includes Fundamentals of Materials, Microstructural Evolution, Electronic Properties of Materials, Mechanical Behavior of Materials, Organic and Biomaterials Chemistry, Materials Processing, Materials Laboratory, Materials Project Laboratory, Polymer Physics, Physical Metallurgy, Electrical, Optical, and Magnetic Materials, Nanoscale Materials, and Engineering for Sustainability. Thesis work concerns the morphology of organic/organometallic block copolymer thin films for use as a lithographic template for magnetic data storage. GPA: 4.8/5.0.

Awards

Outstanding Senior Thesis *May 2009.* Cambridge, MA
Received one of two departmental Outstanding Senior Thesis awards for my thesis study, "The Effects of Polydispersity on the Morphology of Polystyrene-Polyferrocenyldimethylsilane Block Copolymer Thin Films."

Publications

- Joy C. Perkinson, Vivian P. Chuang, C. A. Ross, Janet Acikgoz, G. Julius Vancso, "Size distribution of microdomains in spherical morphology polystyrene-polyferrocenyldimethylsilane block copolymer thin films" *(in preparation).*
- K. L. Krycka, B. B. Maranville, J. A. Borchers, F. J. Castaño, B. G. Ng, J. C. Perkinson, C. A. Ross, "Magnetic domain formation within patterned NiFe/Cu/Co ellipses" *J. Appl. Phys.* 105, 07C120 (2009).
- Filip Ilievski, Joy C. Perkinson, C. A. Ross, "Magnetic reversal phenomena in pseudo-spin-valve films with perpendicular anisotropy" *J. Appl. Phys.* 101, 09D116 1-3 (2007).

Research Experience

Research Assistant, Thomas Group, MIT *October 2009-present.* Cambridge, MA
Ongoing research is in micron-scale patterning of SU-8 photoresist films using two photon lithography. Research aims to investigate the use of malachite green carbinol base (MGCB) dye to decrease feature size and aspect ratio of patterns.

Undergraduate Researcher, Ross Group, MIT Cambridge, MA

January 2008–May 2009.

Fabricated and researched organic/organometallic block copolymer thin films and triblock terpolymer thin films in a clean room to investigate nanoscale patterning and their applications as lithographic masks. Examined effects of chain composition, polydispersity, and volume fraction of copolymers and studied thin film processing. Collaborated with overseas research groups. Wrote technical memos and research articles. Work led to senior thesis and a paper in preparation.

June–August 2007.

Fabricated nanomagnet arrays and multilayer NiFe/Cu/Co ellipses for use as magnetic data storage devices. As part of a small team, researched their use as magnetic data storage devices. Independently collected magnetoresistance and magnetometry data on samples. Co-authored a paper in the Journal of Applied Physics.

June–December 2006.

Researched CoCrPt/Ti magnetic multilayer thin films for applications in magnetic data storage. Worked independently in lab. Fabricated samples via sputter coating, and investigated film properties using vibrating sample magnetometry and alternating gradient magnetometry. Co-authored a paper in the Journal of Applied Physics.

Research Assistant, Glasfeld Group, Reed College *January–August 2004.* Portland, OR

Researched protein crystallography to determine protein structure and interactions and to enhance understanding of protein function. Worked independently in a laboratory to optimize a process for growing MntR protein crystals, and investigated their structure using XRD.

Teaching Experience

3.014: Materials Laboratory, MIT *August–December 2009.* Cambridge, MA

Prepared and supervised laboratory activities of over 60 students, in small groups of 5-10. Modified and tested laboratory module studying polymer chain dimensions using dynamic light scattering. Wrote laboratory handout and gave introductory lecture for dynamic light scattering module. Assisted with laboratory modules studying the microstructural basis of magnetic properties, electrochemical corrosion, and proton-exchange membrane fuel cells. Held weekly office hours to assist with student understanding and technical writing.

3.032: Mechanical Behavior of Materials, MIT *August–December 2009.* Cambridge, MA

Directed and supervised laboratory groups of 4-8 students. Oversaw operation of uniaxial stress testing and microhardness testing. Prepared polymer samples for uniaxial stress testing and developed sample holder for successful stress testing of polydimethylsiloxane. Held weekly office hours to assist with student understanding and technical writing.

3.034: Organic and Biomaterials Chemistry, MIT *August–December 2009.* Cambridge, MA

Prepared and supervised laboratory studies of the antibacterial properties of silver nanoparticles and interfacial nylon synthesis. Prepared solutions and fabricated polyelectrolyte multilayers. Assisted with safe growth of *E. coli* colonies. Helped design and oversee a project fabricating and studying antibacterial fabrics.

Skills

Lab: Extensive experience with clean room fabrication, scanning electron microscopy, magnetometry, spin coating, sputter deposition, reactive ion etching, two photon lithography, interference lithography, scanning probe microscopy, uniaxial stress testing, microhardness testing, dynamic light scattering, machine room fabrication, 3D printing, profilometry, general laboratory procedures, laboratory safety, hydrofluoric acid safety, laser safety, chemical waste disposal, and keeping a detailed lab notebook. Familiar with XRD, gel electrophoresis, calorimetry, electrochemical cells, and magnetoresistance measurements.

Computer experience: Experienced with Macintosh, Windows, and Linux operating systems. Familiar with Scheme, Java, C, and TeX.

Languages: Spanish and Norwegian.

Leadership

President of MIT Assassins' Guild *May 2008–April 2009.*

Managed the five-person governing council of MIT's live-action roleplaying society, a club with over a hundred active members. Negotiated group safety regulations with MIT administrators and campus police. Presided at group meetings.

Secretary of MIT Assassins' Guild *May 2009–present.*

Handled correspondence and event scheduling for MIT's live-action roleplaying society. Took notes at meetings. Acted as advisor for group president, and served on the group's five-person governing council.

Activities

MIT Assassins' Guild *September 2005–present.*

Participated in multiple live-action role-playing games each term. Collaborated with small groups to write four games, ranging in length from one night to ten days long. Have been serving on the five-person governing council since May 2008.

American Jiu Jitsu *February 2007–present.*

Achieved four colored ranks (up to red belt) in the American Jiu Jitsu system of martial arts. Learned practical self-defense techniques for street situations, including strikes, pins, throws, ground defense, defense against an armed attacker, and de-escalation techniques. Discussed awareness of surroundings and appropriate use of force.

Music Concentration at MIT *February 2006–May 2009.*

Focused my humanities studies on music, particularly music theory and composition. Coursework included Introduction to Western Music, the first three levels of music theory and composition from counterpoint up through tonal composition, Music Composition seminar, and Jazz Harmony and Arranging. Performed with the Senegalese Drum Ensemble. Composed over ten pieces for performance.

Varsity Fencing, MIT *September 2005–March 2006.*

Learned sabre fencing with the MIT varsity team. Won first place in the novice competition at a regional fencing meet.

Other Activities *September 2005–present.*

Other extracurricular activities have included mountain climbing, backpacking, skiing, skydiving, running, and electric guitar and Zimbabwean marimba in various bands.