

## MARY LAURA LIND

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Born: Greensboro, NC 1980

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## EDUCATION

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California Institute of Technology	<i>Ph.D.</i> , Materials Science	October 2007
California Institute of Technology	<i>M.S.</i> , Materials Science	June 2004
Yale University	<i>B.S.</i> , Chemical Engineering	May 2002

## RESEARCH INTERESTS & EXPERIENCE

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**Interests:** Advanced materials synthesis and characterization, environmental nanotechnology, membrane technology, sustainable energy and water production

### University of California Los Angeles,

Civil & Environmental Engineering Department

*California NanoSystems Institute (CNSI) Postdoctoral Fellow*

2007-present

Advisor: Professor Eric M.V. Hoek

- Elucidating the underlying mechanisms by which nanoparticles can be used to tailor thin film nanocomposite structure and morphology, and exploring how these material properties govern the performance of nanocomposite membranes in desalination applications.
- Development of advanced membranes for osmotic energy generation

### California Institute of Technology,

Materials Science Department

*Visitor*

2007 -present

*Graduate Research Assistant*

2002- 2007

Advisor: Professor William L. Johnson

Thesis: Ultrasonic Investigation of Elastic Properties of Bulk Metallic Glasses in the Supercooled Liquid

Designed and built apparatus and techniques to perform *in situ* high and low temperature sound velocity measurements; standardized procedure for ease of use by other lab members. Studied mechanical properties of glassy metals, discovered unique relation between fragility and shear modulus of these metals. Developed and characterized novel mg-based alloys.

## HONORS & AWARDS

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California NanoSystems Institute Pioneer Postdoctoral Fellowship	2007-2009
Caltech Materials Science, W.C. Clark Fellowship	2002-2003
NSF REU, MRSEC, Columbia University	2001
NSF REU, Green Processing, North Carolina State University	2000

## PEER REVIEWED PUBLICATIONS

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- Bui N, Lind ML, Hoek EMV, McCutcheon JR, “Novel thin-film composite membranes using electrospun nanofiber supports: A new approach for making membranes for engineered osmosis applications,” (*in preparation for Journal of Membrane Science*).

- Gosh AK, Lind ML, Heong BJ, Jawor A, Hoek EMV, “Effects of Nanoparticle Surface Chemistry on Interfacially Polymerized Zeolite-Polyamide Nanocomposites,” (*in preparation for **Advanced Materials***).
- Lind ML, Suk D., Hoek EMV, “Thin Film Nanocomposite Membranes with Seawater Reverse Osmosis Membrane Performance,” (*in preparation for **Environmental Science & Technology***).
- Lind ML and Hoek EMV, "Fouling Resistance of Zeolite-Polyamide and Pure Polyamide Seawater Reverse Osmosis Membranes," (*in preparation for **Environmental Science & Technology***).
- Lind ML, Gosh AK, Jeong BH, Jawor A, Hou W, Hoek EMV, “Effects of Nanoparticle Size and Polymerization Conditions on Zeolite-Polyamide Nanocomposite Membranes,” **Langmuir**, doi:10.1021/la900938x.
- Lind ML, Beong BH, Hoek EMV, Subramani A, Huang X, “Effect of Mobile Cation on Zeolite-Polyamide Thin Film Nanocomposite Membranes,” **Journal of Materials Research**, 24, 1624 (2009).
- Lind ML, Schroers J, Duan G, Kahl A, Suh JY, Johnson WL, “*In situ* measurement of elastic properties in bulk metallic glasses,” (*submitted to **Applied Physics Letters***).
- Hoffmann DC, Suh JY, Wiest A, Lind ML, Demetriou MD, Johnson WL, “Development of tough, low-density titanium-based bulk metallic glass matrix composites with tensile ductility,” **Proceedings of the National Academy of Sciences**, 105, 51 (2008).
- Hofmann DC, Suh JY, Wiest A, Duan G, Lind ML, Demetriou MD, Johnson WL, “Designing metallic glass matrix composites with high toughness and tensile ductility,” **Nature** 451, 1085 (2008).
- Kim CP, Suh JY, Wiest A, Lind ML, Conner RD, Johnson WL, “Fracture toughness study of new Zr-based Be-bearing bulk metallic glasses,” **Scripta Materialia** 60, (2009).
- Duan G, Wiest A, Lind ML, Kahl A, Johnson WL, “Lightweight Ti-based bulk metallic glasses excluding late transition metals,” **Scripta Materialia**, 58, 6 (2008).
- Duan G, De Blauwe K, Lind ML, Schramm JP, Johnson WL, “Compositional dependence of thermal, elastic, and mechanical properties in Cu-Zr-Ag bulk metallic glasses,” **Scripta Materialia** 58, 3 (2008).
- Duan G, Wiest A, Lind ML, Li J, Rhim WK, Johnson WL, “Bulk metallic glass with benchmark thermoplastic processability,” **Advanced Materials** 19, 23 (2007).
- Johnson WL, Demetriou M, Harmon JS, Lind ML, Samwers K, “Rheology and ultrasonic properties of metallic glass-forming liquids: A potential-energy-landscape perspective,” **MRS Bulletin** 32, 644 (2007).
- Duan G, Lind ML, Deblauwe K, Wiest A, and Johnson WL, “Thermal and elastic properties of Cu-Zr-Be bulk metallic glass forming alloys,” **Applied Physics Letters** 90, 211901 (2007).
- Lind ML, Duan G, Johnson WL, “Isoconfigurational elastic constants and liquid fragility of a bulk metallic glass forming alloy,” **Physical Review Letters** 96, 26 (2006).
- Duan G, Lind ML, Demetriou M, Johnson WL, Goddard W, Cagin T, Samwer K, “Strong configurational dependence of elastic properties for a binary model metallic glass”, **Applied Physics Letters** 89,151901 (2006).
- Choi-Yim H, Xu DH, Lind ML, Loffler JF, Johnson WL, “Structure and mechanical properties of bulk glass-forming Ni-Nb-Sn alloys,” **Scripta Materialia** 54, 2 (2006).

Mary Laura Lind, Ph.D.

## INVITED TALKS

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- Lind ML and Hoek EMV, “Advanced materials for water purification applications,” NSF ADVANCE seminar, California State Polytechnic University Pomona (*March 2009*)
- Lind ML and Hoek EMV, “Nanotechnology and Membranes: The Future of Water Treatment?,” International Conference on Water Scarcity, Global Changes, and Groundwater Management Responses, (December 2008)

## CONTRIBUTED WORK

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- Lind ML, Gosh AK, Jeong BH, Jawor A, Hoek EMV, “Effects of chemistry and nanoparticle size on performance and properties of nanocomposite thin films for reverse osmosis applications,” ACS Colloid & Surface Science Symposium (talk), June 2009.
- Lind ML, Jeong BH, Hoek EMV, Subramani A, and Huang X, “Evaluating Thin Film Nanocomposite Materials as High Performance, Fouling Resistant RO Membranes,” MRS Spring Conference (talk), April 2009.
- Connor DC, Lind ML, Schramm JP, Johnson WL “Thermoplastic processing of bulk metallic glasses,” MRSEC site review (poster), January 2009.
- Lind ML, Jeong BH, Gosh AK, and Hoek EMV, “Physicochemical Factors Influencing the Properties of Nanocomposite Reverse Osmosis Membranes,” ACS Colloid and Surface Science Symposium (talk), June 2008.
- Lind ML, Jeong BH, and Hoek EMV, “Nanocomposite Reverse Osmosis Membranes for Water Desalination,” AWWA CA/NV regional conference (talk), June 2008.
- Lind ML, Jeong BH, and Hoek EMV, “Thin Film Nanocomposite Reverse Osmosis Membranes,” UCLA Technology Forum (poster), May 2008.
- Duan G, Lind ML, Hofmann DC, Wiest A, Demetriou M, Johnson WL, and Goddard III WA, “Synthesis, simulation and properties of novel bulk metallic glasses,” NSF MRSEC annual meeting (poster), September 2006.
- Duan G, Lind ML, Demetriou M, Xu P, Johnson WL, and Goddard III WA, “Elastic and rheological properties of metallic glasses and liquids,” NSF MRSEC annual meeting (poster), September 2005.

## TEACHING EXPERIENCE

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### **California NanoSystems Institute High School Nanoscience Program,**

*Team leader*

2007 - Present

Designed water filtration experiment and instructional materials incorporating nanotechnology for high school classrooms; led team of 5 graduate students during development; led workshop for teachers on how to use experiment in classroom

### **California Institute of Technology**

Applied Physics 105a: States of Matter, Teaching Assistant, *Prof. W.L. Johnson*

2006

Materials Science 90: MS Laboratory, Teaching Assistant, *Prof. V. Ravi*

2005

### **Yale University**

Program Science and Math Achiever Teams (SMArT), volunteer

1999-2002

## **PROFESSIONAL SERVICE**

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Reviewer for Physical Review B 2006 - Present  
Reviewer for Physical Review Letters 2007 - Present

## **TECHNICAL SKILLS**

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- *Materials characterization*: Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM), X-Ray Diffraction (XRD), Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA), Atomic Force Microscopy (AFM), Dynamic Light Scattering (DLS), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Photoelectron Spectroscopy (XPS); membrane performance testing in reverse osmosis or forward osmosis mode; mechanical testing of materials; ultrasonic measurement and analysis of materials
- *Metallic material preparation and processing*: arc-melting, casting, polishing, glass blowing, basic machining
- *Membrane synthesis*: Thin film polyamide, polysulfone
- *Nanoparticle synthesis*: zeolites via microwave heating
- *Software*: Labview, Matlab, C++ , C, Latex, Unix

## **VOLUNTEER ACTIVITIES & INTERESTS**

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### **St. Elmo's Society of Yale University,**

*Treasurer & Board Member*

2004 - Present

- participate in monthly board phone calls; manage \$50,000 budget; pay bills; give guidance to the student delegation.

### **Girls on the Run of Pasadena,**

*Volunteer Head Coach*

2005 - 2007

- coached two practices/week for 12 week sessions helped 3<sup>rd</sup>-5<sup>th</sup> grade girls to complete 5k-running-race.
- Applied for and received \$4,900 Grant from the Pasadena Tournament of Roses Foundation for recruiting, coaching, and training.