CURRICULUM VITAE

Lara A. Estroff

Department of Materials Science and Engineering; Cornell University
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Education and Research Experience

8/05 – **Assistant Professor**, Cornell University, Department of Materials Science and Engineering, Ithaca, NY

8/03 – 7/05 **Post-doctoral Researcher**, Harvard University, Cambridge, MA.
Advisor: Professor George M. Whitesides.

8/98 – 7/03 **Doctor of Philosophy**, Yale University, New Haven, CT Chemistry, Dec. 2003.
Advisor: Professor Andrew D. Hamilton.

8/97 – 8/98 **Visiting Researcher**, Weizmann Institute of Science, Rehovot, Israel.
Advisor: Professor Steve Weiner.

8/93 –5/97 **Bachelor of Arts**, Swarthmore College, Swarthmore, PA, graduated with Honors, Chemistry major, Anthropology minor. May 1997.

Honors

Marilyn Emmons Williams Award for "significant contributions to promoting undergraduate research at Cornell", Cornell Undergraduate Research Board, 2009

Faculty Early CAREER Award, National Science Foundation, 2009

Fiona Ip Li '78 and Donald Li '75 Excellence in Teaching Award, College of Engineering, Cornell University, 2007

James D. Watson Investigator Award, NYSTAR (New York State), 2006

Ruth L. Kirschstein National Research Service Award (NIH Post-Doctoral Fellowship), 2003-2005

Materials Research Society Graduate Student Silver Award, 2002

American Chemical Society Division of Organic Chemistry Graduate Fellowship, 2000-2001

Professional Service

Conference Chair for Spring 2012 Materials Research Society meeting, San Francisco, CA.

Symposium Organizer for the 2011 CCMR symposium, Spring 2011 Ithaca, NY

Symposium Organizer for the symposium "Structure-function relationships in biomaterials/biominerals and bio-mimetic systems", Spring 2009 Materials Research Society meeting, San Francisco, CA, April 2009.

NIH ad hoc reviewer, November 2010.

NSF Review Panels, October 2009, March 2009, November 2007.

Guest Editor for a thematic issue of *Chemical Reviews* on "Biomineralization" published in Nov. 2008.

Symposium Organizer for the "Ronald Breslow Award for Achievement in Biomimetic Chemistry: Symposium in Honor of Joanna Aizenberg", Spring 2008 American Chemical Society meeting, New Orleans, April 2008.

Session Chair for "Molecular Recognition and Self Assembly", Spring 2008 American Chemical Society meeting, New Orleans, April 2008.

Discussion Leader at the "Thin Films and Crystal Growth Mechanisms" Gordon Conference for the session, "Hot Topics", South Hadley, MA, June 2007.

Discussion Leader at the "Thin Film and Crystal Growth Mechanisms" Gordon Conference for the session, "Biological Control of Crystallization", South Hadley, MA, June 2005.

Professional Societies

Member of Sigma Xi, Phi Beta Kappa, American Chemical Society (ACS), Materials Research Society (MRS), American Crystallographic Association (ACA), and ASM International

Graduate Field Memberships

Materials Science and Engineering

Biomedical Engineering

Center Memberships

Cornell Center for Materials Research (CCMR) (Oct. 2005 – present)

Nanobiotechnology Center (NBTC) (Jan. 2008 – present)

Peer-Reviewed Publications

Cornell Independent Career (underlined: Cornell Ph.D. student; *italics*: Cornell Undergraduate student)

26) Lin, D.D.W.; Pathi, S.P.; Dorvee, J.R.; **Estroff, L.A.**; Fischabch, C. "Hydroxyapatite Nanoparticle-containing scaffolds for study of breast cancer bone metastasis." *Biomaterials*, submitted for publication.

25) Li, H.Y.; Xin, H.L.; Kunitake, M.E.; Keene, E.C.; Muller, D.A.; **Estroff, L.A.**, "Calcite prims from mollusk shells (*Atrina rigida*): swiss-cheese-like organic-inorganic single-crystal composites." *Adv. Funct. Mater*. submitted for publication.

24) Li, H.Y.; Fujiki, Y.; Sada, K.; **Estroff, L.A.** "Gel Incorporation inside of organic single crystals grown in agarose hydrogels." *CrystEngComm*, **2011**, DOI: 10.1039/C0CE00118J

23) Keene, E.C.; Evans, J.S.; **Estroff, L.A.** "Silk Fibroin Hydrogels Coupled with the n16N – β-chitin Complex: An *in vitro* Organic Matrix for Controlling Calcium Carbonate Mineralization." *Crystal Growth & Design* **2010**, *10*, 5169-5175.

22) Ndao, M; Keene, E.; Amos, F.F.; Rewari, G.; Ponce, C.B.; **Estroff, L.**, Evans, J.S. "An intrinsically disordered mollusk shell prismatic protein that modulates calcium carbonate crystal growth." *Biomacromolecules*, **2010**,*11*, 2539-2544.

21) Keene, E. C.; Evans, J. S.; **Estroff, L. A.** "Matrix Interactions in Biomineralization: Aragonite nucleation by an intrinsically disordered nacre polypeptide, n16N, associated with a β-chitin substrate." *Crystal Growth & Design* **2010**, *10*, 1383-1389.

20) Li, H. Y.; Xin, H. L.; Muller, D. A.; **Estroff, L. A.** "Visualizing the 3D Internal Structure of Calcite Single Crystals Grown in Agarose Hydrogels." *Science* **2009**, *326*, 1244-1247.

19) Li, H.Y. and **Estroff, L.A.** "Calcite Growth in Hydrogels: Assessing the Mechanism of Polymer Network Incorporation into Single Crystals." *Adv. Mater.,* **2009,** *21*, 470-473.

18) **Estroff, L.A.** "Introduction: Biomineralization." *Chem. Rev.*, **2008**, *108*, 4329-4331.

17) Li, H.Y. and **Estroff, L.A.** "Porous Calcite Single Crystals Grown From a Hydrogel Medium." *CrystEngComm*, **2007**, *9*, 1153-1155.

16) Li, H.Y. and **Estroff, L.A.** "Hydrogels Coupled with SAMs: An *in Vitro* Matrix to Study Calcite Biomineralization." *J. Am. Chem. Soc.*, **2007**, *129*, 5480-5483.

Post-doctoral Research

15) Bilgicer, B.; Thomas, S. W.; Shaw, B. F.; Kaufman, G. K.; Krishnamurthy, V. M.; **Estroff, L. A.**; Yang, J.; Whitesides, G. M. "A Non-Chromatographic Method for the Purification of a Bivalently Active Monoclonal IgG Antibody from Biological Fluids." *J. Am. Chem. Soc.* **2009**, *131*, 9361-9367.

14) Krishnamurthy, V.M.; Quinton, L.J.; **Estroff, L.A.**; Metallo, S.J.; Isaacs, J.M.; Mizgerd, J.P.; Whitesides, G.M. "A Bifunctional Polymer Promotes the Opsonization by Antibodies and Phagocytosis of Gram-Positive Bacteria" *Biomaterials*, **2006**, *27*, 3663-3674.

13) Love, J.C.; **Estroff, L.A.**; Kriebel, J.K.; Nuzzo, R.G.; Whitesides, G.M. "Self-Assembled Monolayers of Thiolates on Metals as a Form of Nanotechnology" *Chem. Rev.*, **2005**, *105*, 1103-1170.

Graduate Research

12) Saraogi, I.; Hebda, J.A.; Becerril, J.; **Estroff, L.A.**; Miranker, A.D.; Hamilton, A.D. "Synthetic α-Helix Mimetics as Agonists and Antagonists of Islet Amyloid Polypeptide Aggregation" *Angew. Chem. Int. Ed.*, **2010**, *49*, 736-739.

11) **Estroff, L.A.**; Hamilton, A.D. "Water Gelation by Small Organic Molecules" *Chem. Rev.,* **2004**, *104*, 1201-1218.

10) **Estroff, L.A.**; Addadi, L.; Weiner, S.; Hamilton, A.D. "An Organic Hydrogel for the Growth of Calcium Carbonate" *Org. & Biomol. Chem*. **2004**, 137-141.

9) **Estroff, L.A.**; Incarvito, C.D.; Hamilton, A.D. "Design of a Synthetic Foldamer that Modifies the Growth of Calcite Crystals" *J. Am. Chem. Soc.* **2004**, *126*, 2-3.

8) **Estroff, L.A.**; Huang, J.S.; Hamilton, A.D. "Fiber Formation in Water by a Mono-Urea Dicarboxylic Acid" *Chem. Commun.* **2003**, 2958-2959.

7) **Estroff, L.A.**; Leiserowitz, L.; Addadi, L.; Weiner, S.; and Hamilton, A.D. "Characterization of an Organic Hydrogel: A Cryo-TEM and X-ray Diffraction Study" *Adv. Mater.* **2003**, *15*, 38-42.

6) **Estroff, L. A.**; Hamilton, A. D. "At the interface of organic and inorganic chemistry: Bio-inspired synthesis of composite materials" *Chem. Mater.* **2001**, *13*, 3227-3235.

5) **Estroff, L. A.**; Hamilton, A. D. "Effective gelation of water using a series of bis-urea dicarboxylic acids" *Angew. Chem. Int. Ed. Engl.* **2000**, *39*, 3447-3450.

Undergraduate Research

4) Paley, R. S.; **Estroff, L. A.**; Gauguet, J. M.; Hunt, D. K.; Newlin, R. C. "Enantiopure η^4-(1-sulfinyldiene)iron(0) tricarbonyl complexes as templates for carbocycle construction via ring- closing metathesis" *Org. Lett.* **2000**, *2*, 365-368.

3) Albert, R. M.; Lavi, O.; **Estroff, L.**; Weiner, S.; Tsatskin, A.; Ronen, A.; Lev-Yadun, S. "Mode of occupation of Tabun Cave, Mt Carmel, Israel during the Mousterian Period: A study of the sediments and phytoliths" *J. Archaeol. Sci.* **1999**, *26*, 1249-1260.

2) Paley, R. S.; **Estroff, L. A.**; McCulley, D. J.; Martinez-Cruz, L. A.; Sanchez, A. J.; Cano, F. H. "Diastereoselective allylations of enantiopure 3- and 4- substituted η^4-(1Z)-(sulfinyldienal)iron(0) tricarbonyl complexes" *Organometallics* **1998**, *17*, 1841-1849.

1) Paley, R. S.; deDios, A.; **Estroff, L. A.**; Lafontaine, J. A.; Montero, C.; McCulley, D. J.; Rubio, M. B.; Ventura, M. P.; Weers, H. L.; de la Pradilla, R. F.; Castro, S.; Dorado, R.; Morente, M. "Synthesis and diastereoselective complexation of enantiopure sulfinyl dienes: The preparation of sulfinyl iron(0) dienes" *J. Org. Chem.* **1997**, *62*, 6326-6343.

Book Chapters

2) Krishnamurthy, V.M.; **Estroff, L.A.**; Whitesides, G.M. "Multivalency in Ligand Design" in *Fragment-Based Approaches in Drug Discovery*; Jahnke, W and Erlanson, D, Eds; **2006**, Wiley-VCH.

1) **Estroff, L.A.**; Hamilton, A.D. "Cryo-TEM, X-Ray Diffraction and Modeling of an Organic Hydrogel" in *Molecular Gels: Materials with Self-Assembled Fibrillar Networks*; Terech, P. and Weiss, R.G., Eds.; **2005**, Springer: Dordrecht, The Netherlands.

Edited Books

1) *Structure-Property Relationships in Biomineralized and Biomimetic Composites*, Kisailus, D.; **Estroff, L.**, Landis, W., Zavattieri, P., and Gupta, H.S., Eds; **2009**, Materials Research Society: Warrendale, PA; Mater. Res. Soc. Symp. Proc. Vol. 1187

Patents

1) Krishnamurthy, V.M.; Estroff, L.A.; Semety, V.; Thomas, S.W.; Kaufman, G.K.; Bilgicer, Z.B.; Whitesides, G.M. "Purification of a Bivalently Active Antibody Using a Non-chromatographic Method" U.S. Provisional Patent Application No. 60/810,488, filed June 1, 2006. U.S. Patent Application filed June 1, 2007.

Grantsmanship

Awarded

"Crystalline and Amorphous Nanomaterials in Breast Cancer Bone Metastasis", Seed Grant from CCMR co-PIs: Estroff (50%) and Fischbach-Teschl (50%) ($170,000, 5/1/10-4/30/11)

"Nano-scale bone mimetics to study breast cancer bone metastasis", NBTC Integrated Research Proposal co-PIs: Estroff and Fischbach-Teschl ($50,000, 7/1/09-6/30/10).

"CAREER: Synthesis, Characterization, and Application of Gel-Grown, Polymer-Reinforced Single Crystals", NSF-DMR, ($472,771, 1/1/09-12/31/13)

"Bio-Inspired Polymer-Reinforced Single Crystals: Synthesis, Structure, and Mechanical Properties", Seed Grant from CCMR, Co-PIs: Baker (20%) and Estroff (80%) ($171,662, 5/1/08-4/30/10)

"Engineering Electrokinetic Activity and Anisotropy in Hydrogels", Seed Grant from CCMR, Co-PIs: Kirby (85%), Bonassar (5%), Stroock (5%), and Estroff (5%) ($210,060, 5/1/08-4/30/10)

"3-D Matrices for Modeling the Bone-Cartilage Interface & Controlling Chondrocyte Activity", Seed Grant from NBTC, PI: Estroff (50%) Co-PIs: Bonassar (25%), Boskey, Stroock (25%) ($100,000 (Estroff portion), 1/1/08 – 12/31/09)

"Nanostructured Block-copolymer Reinforced Calcium Phosphate Composites", NIH/NIDCR, PI: Estroff (1 GRA) ; Co-PI: Uli Wiesner (1 GRA) (R21, $742,959 (total), 6/1/07 – 5/31/10)

"Functionalized Porous Silicon Substrates for the Nucleation and Growth of Hydroxyapatite in Hydrogels", Ithaca-NYC Seed Grant Program, Cornell University/Johnson&Johnson, PI: Estroff (60%); Co-PI: Adele Boskey (40%) (Weill Medical College and Hospital for Special Surgery) ($50,000, 3/1/07-2/28/08)

"Bio-Inspired Materials Synthesis of New Materials for Bone and Tooth Restoration", NYSTAR, JD Watson Investigator Award, ($200,000 (15% overhead), 1/1/07 - 12/31/08)

"Heterogeneity and Function in Skeletal Tissues: Multi-Scale Characterization and Synthesis", Seed Grant from CCMR, NSF-DMR MRSEC, Co-PIs: Bonassar (33%), Baker, Cohen, Estroff (33%) and van der Meulen (33%) ($127,908 (Estroff portion), 5/1/06 - 4/30/08)

"Self-Assembled Monolayers as Nucleating Surfaces to Screen Rapidly for Polymorphs of Organic Crystals.", American Chemical Society/Petroleum Research Fund, ($35,000 (no overhead), 9/1/06 – 8/31/08)

Courses Taught

Spring 2011 MSE/BME 5620 – Biomineralization (enrollment:)

Fall 2010 MSE 3010/5810 – Materials Chemistry (enrollment: 54 UG/12 G)

Spring 2010 MSE 5210 – Properties of Solid Polymers (enrollment: 30 UG/ 12 G)

Spring 2009 MSE/BME 5620 – Biomineralization (enrollment: 8 UG/ 9 G)

Fall 2008 ENGRG 1050 – Freshmen Advising Seminar (18 UG)

Fall 2008 MSE 3010/5810 – Materials Chemistry (enrollment: 31 UG/ 12 G)

Spring 2008 MSE 461 – Biomedical Materials (enrollment: 73 total)

Materials elective targeted at upper-level undergraduate and graduate students

Spring 2007 MSE/BME 562 – Biomineralization (enrollment: 20 UG/ 4 G)

New elective course targeted at upper-level undergraduate and graduate students, conceived and developed.

Fall 2006 MSE 301/581 – Materials Chemistry (enrollment: 38 UG/ 4 G)

Required MSE core course, junior level. Redesigned curriculum.

Spring 2006 MSE 404 – Senior Lab (enrollment: 7)

Outreach Activities

Cornell Institute for Chemistry Teachers (July 2010)

EYH (Expanding Your Horizons) Adult Panel (April 2010)

Co-lead "Bring your child to work" activity in MSE (April 2010)

Emcee of Ithaca Egg Drop (sponsored by Ithaca Science Center) (April 2010)

Lead "kitchen chemistry" program for students at the Ithaca Youth Bureau (through CCMR Outreach).

Written "Ask a Scientist" Columns.

Invited speaker for Curie Academy (1 week program for high school women in engineering) and Catalyst Program (1 week program for high school URMs in engineering) (Summer 2007 and Summer 2008, Summer 2010).

RET (Research Experience for Teachers) mentor (Summer 2007).