Curriculum Vitae

Chao Zhong

Postdoctoral Associate, MIT Synthetic Biology Center Research Laboratory of Electronics, Dept. of Electrical Engineering and Computer Science and Dept. of Biological Engineering Massachusetts Institute of Technology 77 Massachusetts Ave NE47-235 Cambridge, MA 02139 E-mail: <u>zhongc@mit.edu</u> Phone: 607-220-4124 (Cell) Website: https://sites.google.com/site/chaowebpage/

PRIMARY RESEARCH INTERESTS

Synthetic biology for engineering next-generation biomaterials and bionanotechnology Nanobiomaterials and nanodevices for medical applications Micro/nanomanufacturing, bio-inspired devices fabrication and Integration

EDUCATION

Cornell University, Ithaca, NY, USA

Ph.D. Biomedical Engineering & Polymer Science, 2009, Dissertation: Synthetic Polysaccharide-Mediated Biomimetic Syntheses of Inorganic Materials.

Beijing University of Chemical Technology, Beijing, China,

M. E., in Polymer Science, 2004.

Tian Jin University, Tian Jin, China,

B.S. in Materials Science & Engineering, 2001

RESEARCH EXPERIENCE

Postdoctoral Associate, Research Laboratory of Electronics and MIT Synthetic Biology Center, Massachusetts Institute of Technology, Boston, MA (2012 —)

Advisor: Professor Timothy K. Lu

- Synthetic biology as a novel toolbox for engineering biomaterials and bionanotechnology
- Bio-inspired engineering of underwater adhesive biomaterials with synthetic biology

Postdoctoral Associate, Materials Science & Engineering, University of Washington, Seattle, WA (2009 – 2011), Advisor: Professor Marco Rolandi

- Investigation of protonic conduction of biological nanofibers/films, and development of novel nanobioprotonic field effect transistors.
- Multi-scale fabrication and patterning of chitin nanofiber based structures into micro-needle structures for transdermal drug delivery and biophotonic devices.

Ph.D. Research Assistant, Cornell University, Ithaca, NY (2004 - 2009),

Advisor: Professor C. C. Chu

- Design and preparation of novel chitosan derivatives and chitosan-based hydrogels as organic templates for growth of calcium carbonate & calcium phosphate.
- In vitro study of the roles of acid polysaccharide in calcium carbonate crystallization.
- Biomimetic mineralization of hydrogels as novel bone tissue engineering scaffolds.

TECHNICAL SPECIALTIES:

Molecular Biology and Protein Engineering: SDS/PAGE, Western blot, PCR, Protein Expression and Purification, Micro-bead display and cell surface display, DNA shuffling.

Polymer synthesis and Characterization: NMR (including 2-D), CD, UV-Vis, DLS, FTIR and Raman spectra.

Nanomaterial Synthesis and Characterization: Scanning Probe Microscopy: AFM contact/tapping mode metrology, Conductive AFM. TEM and SAED, SEM and EDS, Cross-polarized light Microscopy, XRD, XPS, DSC, TGA, DMA.

Physic Devices Integration and Measurement: Photolithography, Replica molding, Microcontact Printing, Agilent tech (conductivity test), Probe station and Wire-bonding.

SELECTED PUBLICATIONS

C. Zhong, C.C.Chu, Biomimetic mineralization of acid polysaccharide-based hydrogels: Towards porous 3-dimensional bone-like biocomposites. *Journal of Materials Chemistry* 2012, 22, 6080-6087. *(Highlighted in Biomimetic Materials Collection on RSC Biomaterials Science Blog)*

A. Cooper, C. Zhong, Y.Kinoshita, R. Morrison, M. Rolandi, M. Zhang. Self-assembled chitin nanofiber templates for artificial neural networks. *Journal of Materials Chemistry* 2012, 22, 3105-3109.

C. Zhong, Y. X. Deng, A. Kapetanovic, M. Rolandi, A polysaccharide bioprotonic field-effect transistor. *Nature Communications 2011*, *2*, 476. (*Highlighted by IEEE Spectrum and MRS website, see also news in New York Times, Science Daily, Discovery News, Popular Science, MIT Technology Review, Europa Press, UW today, Futura Sciences, PhysOrg, Nanowerk, Engadget and many other media reports).*

C. Zhong, A.Kapetanovic, Y. X. Deng, M. Rolandi, A chitin nanofiber ink for airbrushing, replica molding and microcontact printing of self-assembled marco-, micro- and nanostructures. *Advanced Materials 2011*, *23*, 4776-4781. (*Inside Cover Feature*)

C. Zhong, A. Cooper, A. Kapetanovic, M. Zhang, M. Rolandi, A facile bottom-up route to self-assembled biogenic chitin nanofibers, *Soft Matter* **2010**, 6, 5298-5301.

C. Zhong, C. C. Chu, On the origin of amorphous cores in biomimetic calcium carbonate spherulites: new insights into spherulitic crystallization, *Crystal Growth and Design* 2010, 10, 5043-5049. (*Top 20 most accessed articles for 3 months from Nov 2010 to Jan 2011*)

C. Zhong, J. Wu, C.A. Reinhart-King and C. C. Chu, Synthesis, characterization and cytotoxicity of photo-crosslinked maleic chitosan-PEGDA hybrid hydrogels, *Acta Biomaterialia*, 2010, 6, 3908-3918.
C. Zhong, C. C. Chu, Acid polysaccharide-induced amorphous calcium carbonate (ACC) films: colloidal nanoparticle self-organization process. *Langmuir* 2009, 25, 3045–3049.

C. Zhong, Jing Zhao, Mingzhi Huang. Preparation of N,O-Carboxymethyl chitosan by a Two-step alkalization approach *Fine Chemicals* **2004**, *5*, 338-341.

C. Zhong, C.C.Chu, Controlled synthesis and self-assembly of N-maleic chitosan. (Submitted to Biomacromolecules)

Y. X. Deng, E. Josberger, J. H. Jin, B. A. Helms, **C. Zhong**, M.P. Anantram, M. Rolandi. H⁺-type and OH⁻-type biological protonic semiconductors and complementary devices. (*Submitted to PNAS*)

C. Zhong, A. Cheng, T. K Lu, Reverse biologically inspired engineering of fibrous self-healing underwater adhesives, 2013. (In preparation)

PATENTS

C. Zhong, C.C.Chu, Organo-soluble chitosan precursors and chitosan-derived biomaterials prepared thereof. (US2011/0150999 A1)

C. Zhong, M. Rolandi, Biogenic chitin nanofibers 3D microstructures through replica molding. (US provisional application NO. 61/492,927)

HONORS

Final List, Science as Art Competition at the Fall 2011 Materials Research Society (MRS) Meeting. Chairs fund award, Gordon Research Conference (GRC) in *Thin Film & Crystal Growth Mechanisms* 2009.

Chairs fund award, Gordon Research Conference (GRC) in Biomineralization 2008.

Human Ecology Alumni Association (HEAA) Graduate Student Research Award, Oct 2008.

Liu Memorial Award and Wu Scholarship, May 2008, Cornell University (In recognition of excellent graduate research).

First place winner, CCMR Microscopy Image Contest, Summer 2006, Cornell University.

CONFERENCES AND PRESENTATIONS

Invited Talk "Biomimetic Mineralization of Acid Polysaccharide-based Hydrogels: Inspiration from Recent Findings about Organic/mineral Interface in Bone", Spring 2013 Annual meeting of the Society for Biomatierials (SFB).

Talk "Multi-scale patterning of self-assembled chitin nanofiber structures", 2011 MRS Fall conference, Dec 2011, Boston.

Talk "A chitin nanofiber ink for multi-scale fabrication of self-assembled nanofiber structures", 2011 MRS Directed Self-assembly of Materials Workshop, Sep 2011, Tennessee.

Poster "An AFM study of self-Assembled chitin nanofiber morphology and mechanical Properties" 16th International Conference on Solid Films and Surfaces, July 2012, Genoa, Italy

Poster "A facile bottom-up route to self-assembled biogenic chitin nanofibers",MRS (Materials Research Society) Conference, Dec 2010, Boston.

Poster "Amorphous cores in spherulites: A common but overlooked phenomenon?", Gordon Research Conference (GRC) in *Thin Film & Crystal Growth Mechanisms*, July 2009.

Poster "On the origin of amorphous cores in spherulites: New insights into spherulitic crystallization" Gordon Research Conference (GRC) in *Biomineralization*, Aug 2008.

Poster "Coexistence of amorphous cores and calcite in Acid-polysaccharide mediated CaCO₃ spherulites", MRS (Materials Research Society) Conference, Dec 2008, Boston.

PROFESSIONAL MEMBERSHIP AND SERVICE

Member of Biomedical Engineering Society (BMES), Society For Biomaterials (SFB) and Materials Research Society (MRS).

Session co-organizer for general session "Biomimetic Surfaces: From Multi-scale Fabrication Methods to Diagnostic, Therapeutic and Clinical Applications" at the 2013 Annual Meeting for the Society For Biomaterials (SFB).

Session organizer for symposium "Biomaterials Design and Tissue Engineering via Synthetic Biology" at the 2013 Annual Meeting of the Society For Biomaterials (SFB).

Journal Reviewer: (CrystEngComm, Acta Biomaterialia, Biomaterials, Soft Matter, Langmuir, Physical Chemistry Chemical Physics (PCCP), Chem Communications, Journal of Material Chemistry, Green Chemistry, J. Appl. Phys.) Abstract Reviewer: 2013 Annual meeting of the Society For Biomaterials (SFB)

GRANT APPLICATION EXPERIENCE

Assisting advisors in grant writing (NSF Early Career Award Program and Office of Naval Research Young Investigator Program) K99/R00 NIH Pathway to Independence Award

TEACHING EXPERIENCE

Laboratories: Physiochemical characterization of polymers and cross-polarized Light microscopy characterization of amorphous and crystalline materials.

Lectures: Introduction to biomaterials and devices for human body repairs.

Mentoring: 1 graduate student and 1 undergraduate student (Ph.D. period), 4 graduate students, 7 undergraduate students and 1 high school student (Postdoc period).

Grading: 4 different undergraduate level courses in biomaterials and polymer science.

REFERENCES

C. C. Chu (Ph.D. Advisor)

Rebecca Q. Morgan '60 Professor, Fiber Science Program, and Biomedical Engineering Program, Department of Biomedical engineering 243 Martha Van Rensselaer Hall, Cornell University Phone: (607) 255-1938, Email: cc62@cornell.edu

Timothy K. Lu (Postdoctoral Advisor)

Innovator TR35 2010 & Presidential Early Career Awardee, Doherty Assistant Professor of Electronic Engineering MIT Synthetic Biology Center Research Laboratory of Electronics (RLE), Department of Electrical Engineering and Computer Science and Department of Biological Engineering Massachusetts Institute of Technology 77 Massachusetts Ave NE47-221 Cambridge, MA 02139 Phone: (617)-715-4808, Email: timlu@mit.edu

Marco Rolandi (Postdoctoral Advisor), Innovator TR35-GI 2012

Assistant Professor, Department of Materials Science & Engineering, University of Washington, Seattle, WA, 98195 Phone: (206) 221-0309, Email: rolandi@uw.edu