You Zhai

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Professional Profile

- Five-year experience designing and conducting novel chemistry synthesis of colloidal heavy-metal-free semiconductor nanocrystals with various compositions and morphologies
- Five-year experience characterizing and analyzing the crystal structure, chemical composition, and optical properties of nanomaterials
- One-year experience simulating crystal structure, electronic wavefunction, mechanical strain, and plasmonics
- Strong communication and teamwork skills; self-motivated

Education

UNIVERSITY OF ILLINOIS Urbana-Champaign, IL

Ph.D. Candidate in Materials Science and Engineering, *May 2017* GPA: 3.83/4.00

Focus: Chemistry Synthesis and Physical Characterization of Colloidal Nanocrystals

PEKING UNIVERSITY Beijing, China

B.S. in Materials Chemistry, *July 2011* GPA: 3.75/4.00 Rank: 4/156

Research Experience

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, UIUC

Graduate Research Assistant, Supervisor: Moonsub Shim Oct. 2011 - Present

- Boosted the photoluminescence quantum yield by over 100X of heavy-metal-free semiconductor quantum dots for solid-state lighting applications
- Increased the local electric field enhancement factor by 30% by converting $Cu_{2-x}S$ from 2D nanodisks to 1D nanorods for plasmonic applications
- Established a procedure to control the anisotropic growth modes of $Cu_{2-x}S$-based heterostructured nanorods
- Developed an approach to the superlattice formation in $Cu_{2-x}S$-based I-III-VI heterostructured nanorods

INORGANIC PHOTOVOLTAIC MATERIALS AND DEVICES LAB, PEKING UNIVERSITY

Undergraduate Research Assistant, Supervisor: Fuqiang Huang Aug. 2010 - Jun. 2011

- Boosted light absorption in the visible range by more than 100X by compositing 2D multilayered titanate nanosheet with porphyrin salts for solar cell applications

ORGANIC & OLIGOMERIC OPTOELECTRONIC MATERIALS LAB, PEKING UNIVERSITY

Undergraduate Research Assistant, Supervisor: Dahui Zhao Sept. 2008 - Aug. 2010

- Revealed the phosphorescence quenching mechanism of oligofluorene-tethered *fac*-$Ir(ppy)_3$ complexes for OLED applications

Work Experience

LAM RESEARCH CORPORATION Tualatin, OR

Process Engineer Intern Jun. 2016 - Aug. 2016

- Improved the production throughput by 13% in the ALD oxide film deposition process
- Formulated a protocol for the real-time monitoring of precursor flows and valve condition

Publications

- Zhai, Y.; Shim, M. Cu_2S/ZnS Heterostructured Nanorods: Cation Exchange *vs*. Solution-Liquid-Solid-like Growth. *ChemPhysChem* **2016**, *17*, 741–751.
- Zhai, Y.; Shim, M. Benefitting from Dopant Loss and Ostwald Ripening in Mn Doping of II-VI Semiconductor Nanocrystals. *Nanoscale Res. Lett.* **2015**, *10*, 423-435.
- Nam, S.; Oh, N.; Zhai, Y.; Shim, M. High Efficiency and Optical Anisotropy in Double-Heterojunction Nanorod Light-Emitting Diodes. *ACS Nano* **2015**, *9*, 878–885.
- Oh, N.; Nam, S.; Zhai, Y.; Deshpande, K.; Trefonas, P.; Shim, M. Double-Heterojunction Nanorods. *Nat. Commun*. **2014**, *5*, 3642-3650.

Patents

- Shim, M.; Oh, N.; Zhai, Y.; Nam, S.; Trefonas, P.; Deshpande, K.; Joo, J. Multi-heterojunction nanoparticles, methods of manufacture thereof and articles comprising the same, U.S. Patent 9123638 B2, 2015.

Presentations

- Continuous Transition between 1D and 2D Growth of Copper Sulfide Nanocrystals

MSE hard materials seminar, UIUC, Sept. 2016

- Cu_2S/ZnS Heterostructured Nanorods: Cation Exchange *vs.* Solution-Liquid-Solid-like Growth

MRS Spring Conference, Phoenix, AZ, Mar. 2016 & MSE hard materials seminar, UIUC, Oct. 2015

- Color-center-doped II-VI Semiconductor Nanocrystals: Colloidal Synthesis and Properties

MSE 403 guest presentation, UIUC, Nov. 2015

- Benefitting from Dopant Loss and Ostwald Ripening in Mn Doping of II-VI Semiconductor Nanocrystals

MSE hard materials seminar, UIUC, Nov. 2014

- CdS/multiple-CdSe/ZnSe Double Heterostructures - Synthesis and Characterization

MSE hard materials seminar, UIUC, Mar. 2014

Leadership Experience

- Mentored four senior students to improve their experiment and literature-survey skills
- Established the safety training procedure and the hazardous chemical waste disposal management in the lab
- Demonstrated researches in our group to perspective graduate students during campus visits
- Served as a guest panelist in the Engineering International Roundtable
- Demonstrated vacuum physics to the general public in the Engineering Open House

Selected Skills

(High Resolution) Transmission Electron Microscopy, Scanning Transmission Electron Microscopy, Energy-Dispersive X-ray Spectroscopy, X-ray Diffraction, Optical Spectroscopies, Time-resolved Photoluminescence Spectroscopy, Spectroscopic Ellipsometry, Scanning Electron Microscopy, X-ray Photoelectron Spectroscopy, Electron Paramagnetic Resonance Spectroscopy, Nuclear Magnetic Resonance Spectroscopy, Atomic Force Microscopy, Crystal structure modeling, Mathematica, Python