

Jie Shen

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RESEARCH INTEREST

Interest 1: using DNA to precisely assemble inorganic nanomaterials into one-, two- or three-dimensional architectures; exploring their structure-dependent properties such as surface plasmon resonance, magnetic moment interaction, and charge/energy transfer with significant application potentials.

Interest 2: using luminescent nanomaterials to remote-control the assemble/disassemble of DNA architectures under light stimulation; developing DNA biomedical applications with on/off switchable property; developing optical manipulation methodology to aid DNA architecture formation.

ACADEMIC POSITIONS

2013.07-Present Wyss Institute for Biologically Inspired Engineering

Harvard University

Postdoc fellow

Supervisor: Dr. Peng Yin

2010.12-2013.06 Biochemistry and Molecular Pharmacology

University of Massachusetts Medical School

Postdoc fellow

Supervisor: Dr. Gang Han

EDUCATION

2005.09-2010.07 College of Chemistry & Molecular Engineering

Peking University

Ph.D. in Inorganic Chemistry, June 2010.

Dissertation: Synthesis, Modification and Optical-Probe Application

Research of Rare Earth Based Luminescent Nanoparticles

Supervisor: Prof. Ling-dong Sun, Prof. Chun-hua Yan

2001.09-2005.07 College of Chemistry & Molecular Engineering
Peking University
Bachelor Degree of Science in Chemistry, July 2005.
Thesis: Synthesis and Bio-modification of Water-Soluble $\text{YVO}_4:\text{Eu}$
Nanocrystalline
Supervisor: Prof. Ling-dong Sun, Prof. Chun-hua Yan

AWARDS

- 2005 College's Award for Thesis Excellence, Peking University.
- 2007 Academic Performance Scholarship, Peking University.
- 2008 "Donggang" Scholarship, Peking University.
- 2009 "Triple-A" outstanding Student, Peking University.

SKILLS

Design and Synthesis of Functionalized Nanomaterials

- Wet-chemical synthesis of colloidal nanoparticles with tunable luminescent and magnetic properties.
- Surface modification and biomolecule functionalization of nanoparticles.

Microscopic/Animal *in vivo* Imaging and Spectral analysis

- Handling Epi, confocal, two-photon and Raman microscope.
- Handling 2-D animal fluorescence imaging system.
- Reconstructing of Epi-microscopy and spectrometer with external laser accessories.
- Solid knowledge background on optical spectroscopy.

Cell Culture and Animal Experiments

- Regular cell culture and cytotoxicity assay, DNA/RNA transfection and detection.
- Handling mouse and rabbit *in vivo* experiment (Umass licensed).

Computer Graphic Design

- *Autodesk 3ds Max* system for 3D model construction.
- *Photoshop* system for academic illustration (4 cover pictures published on

international academic journals).

Instruments

- Maestro EX animal in vivo imaging system (Caliper Life Sciences)
- Epi-fluorescence microscope (Nikon Ti-u)
- Laser scanning confocal microscope (Nikon A1R)
- Time-Resolved spectral imaging system on Nikon A1R (PicoQuant GmbH)
- Confocal Raman microscope (HORIBA LabRAM HR800)
- Two-photon microscope (Zeiss LSM 710)
- Ultraviolet and visible spectroscopy (Hitachi U-3010, Shimadzu UV-3100)
- Fluorescence spectrophotometer (Hitachi F-4500)
- Fourier transformation infrared spectroscopy (Nicolet Magna-IR 750)
- Zetasizer Nano instrument (Malvern ZEN3600)
- Multimode microplate reader (Spectra Max Gemini XS)
- ArrayIt SpotBot biochip microarrayer (SpotBot® 3 TeleChem Inc.)
- Powder X-ray diffraction (Rigaku D/MAX-2000)
- Transmission electron microscopy (JEOL 200CX, JEOL 2100)
- Thermo-gravimetric and differential thermal analysis (TA Universal V2.6)

Publications

1. **Jie Shen**, Guanying Chen, Anne-Marie Vu, Wei Fan, Osman S. Bilsel, Chun-Chih Chang, Gang Han*, “Engineering the Upconversion Nanoparticle Excitation Wavelength: Cascade Sensitization of Tri-doped Upconversion Colloidal Nanoparticles at 800 nm”, *Advanced Optical Materials*, 2013, DOI: 10.1002/adom.201300160.
2. **Jie Shen**, Guanying Chen, Tymish Y. Ohulchanskyy, Samuel J. Kesseli, Steven Buchholz, Zhipeng Li, Paras N. Prasad, and Gang Han*, “Tunable Near Infrared to Ultraviolet Upconversion Luminescence Enhancement in (α -NaYF₄:Yb,Tm)/CaF₂ Core/Shell Nanoparticles for In Situ Biocompatible Photoactivation”, *Small*, **2013**, DOI: 10.1002/smll.201300234.
3. Guanying Chen, **Jie Shen**, Tymish Y. Ohulchanskyy, Nayan Patel, Artem Kutikov, Zhipeng Li, Jie Song, Ravindra K. Pandey, Hans Ågren, Paras N. Prasad*, and Gang Han*. “Heterogeneous (α -

NaYbF₄:Tm³⁺/CaF₂ Core/Shell Nanoparticles with Efficient Near-Infrared to Near-Infrared Upconversion for High-Contrast Deep Tissue Bioimaging”, *ACS Nano*. **2012**, 6, 8280–8287.

4. **Jie Shen**, Liang. Zhao, Gang. Han*, “Lanthanide-doped upconverting luminescent nanoparticle platforms for optical imaging-guided drug delivery and therapy”, *Adv. Drug. Deliv. Rev.* **2012**, DOI: 10.1016/j.addr.2012.05.007.
5. Liang Zhao, Artem Kutikov, **Jie Shen**, Chunying Duan, Jie Song*, Gang Han*, “Stem Cell Labeling using Polyethylenimine Conjugated (α -NaYbF₄:Tm³⁺)/CaF₂ Upconversion Nanoparticles”, *Theranostics*, **2012**, in revising.
6. Jian-Qin Gu, **Jie Shen**, Ling-Dong Sun*, Chun-Hua Yan*, “Resonance Energy Transfer in Steady-State and Time-Decay Fluoro-Immunoassays for Lanthanide Nanoparticles Based on Biotin and Avidin Affinity”, *J. Phys. Chem. C*, **2008**, 112, 6589–6593.
7. **Jie Shen**, Ling-Dong Sun*, Jia-Dan Zhu, Liu-He Wei, Hong-Fang Sun, Chun-Hua Yan*, “Biocompatible Bright YVO₄:Eu Nanoparticles as Versatile Optical Bioprobes”, *Adv. Funct. Mater.*, **2010**, 20, 3708–3714.
8. **Jie Shen**, Ling-Dong Sun*, Ya-Wen Zhang, Chun-Hua Yan*, “Bifunctional Fe₃O₄/ β -NaYF₄:Yb,Er Hetero-Nanoparticles via a Crosslinker Anchoring Strategy”, *Chem. Commun.*, **2010**, 46, 5731–5733.
9. **Jie Shen**, Ling-Dong Sun, Chun-Hua Yan*, “Luminescent Rare Earth Nanomaterials for Bioprobe Applications”, *Dalton Trans.*, **2008**, 5687–5697.
10. Huan-Ping Zhou, Hao-Shuai Wu, **Jie Shen**, An-Xiang Yin, Ling-Dong Sun, Chun-Hua Yan*, “Thermally Stable Pt/CeO₂ Hetero-nanocomposites with High Catalytic Activity”, *J. Am. Chem. Soc.*, **2010**, 132, 4998–4999.
11. Ye-Fu Wang, Ling-Dong Sun*, Jia-Wen Xiao, Wei Feng, Jia-Cai Zhou, **Jie Shen**, Chun-Hua Yan*, “Rare-Earth Nanoparticles with Enhanced Upconversion Emission and Suppressed Rare-Earth-Ion Leakage”, *Chem-Eur. J.* **2012**, 18, 5558–5564.
12. Jia-Cai Zhou, Ling-Dong Sun*, **Jie Shen**, Jian-Qin Gu, Chun-Hua Yan*, “Fluorescent-magnetic Nanocrystals: Synthesis and Property of YP_xV_{1-x}O₄:Eu @GdPO₄ Core/Shell Structure”, *Nanoscale*, **2011**, 3, 1977–1983.