

# Sidong Lei

Sidong. Lei@rice.edu  
6100 Main Street, Houston, 77005  
Texas, U. S.  
Cell Phone: (281)222-0972

## RESEARCH INTERESTS

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- Two dimensional atomic layered epitaxy growth
- Growth and characterization of Selenium and Tellurium based hetero-structures (MoS<sub>2</sub>, MoSe<sub>2</sub>, MoTe<sub>2</sub> etc.)
- Electronic and Optoelectronic devices based on Novel layered materials (GaSe, GaS etc.)
- Deep UV light sources based on BN layered structures

## EDUCATION

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- Jan.2012~ Present* Ph.D. candidate, Applied Physics Program,  
Department of Mechanical Engineering and Material Science.  
Advisor: Prof. Pulickel M. Ajayan
- Sep. 2010~ Dec.2011* Department of Physics and Astronomy, Rice University, Houston, TX, U. S.  
Research Assistant in Prof. Randy Hulet's Ultra-cold Atomic Physics Lab.
- Sep. 2007~ Jun. 2010* Master of Science in Physics  
Department of Physics, Nanjing University, Nanjing, China
- Sep. 2003 ~ Jun. 2007* Bachelor of Science, Physics  
School of Physics, Nankai University, Tianjin, China

## SCHOLARSHIPS & HONORS

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- Nov. 2009* Corning Scholarship  
(awarded by Corning Incorporated, U.S., to honor graduate students doing excellent works on materials and devices for energy conversion and energy saving)
- Dec. 2008* Excellent Graduate Student Scholarship, Nanjing University
- Jun. 2007* Annual Excellence Award, Nankai University
- Jun. 2007* Excellent Graduate Student Award, Nankai University  
(to honor the student with outstanding performances and doing contribution to the development and construction of Nankai University)
- Jun. 2007* Excellent Graduation Thesis Award, Nankai University
- Oct. 2006* Annual Excellence Award, Nankai University

## RESEARCH EXPERIENCES

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- Jan. 2012~ Present* **Research Assistant, Ajayan Group, Rice University**
- Single atomic layer GaSe and GaTe fabrication by epitaxy
  - Single atomic layer boron nitride fabrication by CVD and epitaxy
  - GaSe and MoS<sub>2</sub> based photo detectors
  - Design and fabrication of homemade growth and characterization facilities (probe-station, field emission, epitaxial PVD)
- Sep. 2010~ Dec. 2011* **Research Assistant, Hulet Atom Cooling Group, Rice University**
- Bose-Einstein condensation in diluted ultra-cold lithium atoms
  - Optics and electronics design of new ultra-cold atomic soliton experiment
  - Laser cooling system design and realization
  - High vacuum system fabrication and maintenance
  - Software for controlling, communication, data acquisition and analysis.

Sep. 2007~  
Jun. 2010 **Research Assistant in Eco-materials and Renewable Research Center**  
(Supported by National Basic Research Program of China (973 Program))

- Novel rare earth photoluminescent materials for solid state lighting source
- Electronic characterization with photoluminescence and Raman spectra
- Novel non-TiO<sub>2</sub> photo-catalysts
- Theoretical analysis of non-linear optical cavity system

Sep. 2006 ~  
Jan. 2007 **100 Projects for Creative Research for Undergraduates in Nankai University**

- Rare earth organic coordination compound synthesis and photoluminescence characterization

## PUBLICATIONS

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- “Design and Theoretical Analysis of Resonance Cavity for Second-Harmonic Generation with High Efficiency”. **Sidong Lei**, Yao Yao, Zhaosheng Li, Tao Yu, Zhigang Zou. *Applied Physics Letters*, 98 (2011), 031102
- “Enhancement in Photoluminescence of CaMoO<sub>4</sub>: Eu<sup>3+</sup> Through Introducing MVO<sub>4</sub> (M = Y or Bi)”. **Sidong Lei**, Xueliang Zhang, Zhaosheng Li, Tao Yu, Zhigang Zou. *Journal of The Electrochemical Society*, 156 (2009), J367
- “Enhancement Luminescence in NaIn(WO<sub>4</sub>)<sub>2</sub> via Bismuth Doping” Yao Yao, **Sidong Lei**, Zhaosheng Li, Tao Yu, Zhigang Zou. *Journal of The Electrochemical Society*, 157 (2010), P63
- “Synthesis and Characterization of Rare Earth Complex with Fluorescein and 1,10 – Phenanthroline.” **Sidong Lei**, Xuewei Cao, et al. *The Journal of Light Scattering*: 19 (2007), 3, 290

## PATENTS

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- “The Method of Synthesizing Rare Earth Doped Li<sub>2</sub>SrSiO<sub>4</sub>”. Zhigang Zou, **Sidong Lei**, Xueliang Zhang, Zhaosheng Li, Mei Zhu. Patent of China, Application Code: 200810195917.6
- “A New Rare Earth and Bi(III) Doped AlIn(WO<sub>4</sub>)<sub>2</sub> Type Fluorescence Material” Zhigang Zou, Yao Yao, **Sidong Lei**, Zhaosheng Li. Patent of China, Application Code: 200910031920.9

## TECHNICAL SKILLS

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- Mechanical design and fabrication: Auto-CAD, lathe and milling machines, TIG-welding, vacuum system fabrication.
- CVD and epitaxial growth techniques
- Micro-fabrication and clean-room techniques (mask making and developing, photolithography, e-beam lithography, material etching and deposition, SEM, etc.)
- Electronic and optical characterization, low temperature measurements, low current measurements
- Spectroscopy: IR and Raman spectra, photoluminescence, UV-Vis, XPS, etc.
- Software skills: C/C++ for hardware control, LabVIEW and DAQ system, Python, Mathematica (for theoretical simulation and numerical calculation), VISA communication agreement, NI 488 communication agreement, etc.
- Hardware skills: FPGA, microcontroller, digital circuit design and fabrication, PID system.

## REFERENCES

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1. Prof. Pulickel M. Ajayan  
Department of Mechanical Engineering and Materials Science, Rice University, Houston TX 77005  
Email: [ajayan@rice.edu](mailto:ajayan@rice.edu) Ph: +1-(713)-348-5904
2. Dr. Randall G. Hulet  
Physics and Astronomy Department, Rice University, Houston, TX 77005  
Email: [randy@rice.edu](mailto:randy@rice.edu) Ph: +1-(713)-348-6087
3. Dr. Liehui Ge  
Department of Mechanical Engineering and Materials Science, Rice University, Houston TX 7700  
Email: [liehui@rice.edu](mailto:liehui@rice.edu) Ph: +1-(713)-348-5654