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### RESEARCH INTERESTS

- Synthesis and characterization of novel functional low-dimensional materials; organic-inorganic hybrid system design and function realization aiming at bio-sensing, energy harvesting, environmental and medical monitoring.
- Design and fabrication of novel optoelectronic and photonic device for the applications in near-field optics, and sensing.
- Studies on surface and interfacial quantum states in low-dimensional systems and their applications in quantum operation, high-performance computing and data storage.

### EDUCATION

- Ph. D.** of Applied Physics, Department of Material Science and NanoEngineering  
Rice University, Houston, Texas, U. S. **Dec. 2015**
- M. S.** Department of Physics, Nanjing University, Nanjing, China **Jun. 2010**
- B. S.** Department of Physics, Nankai University, Tianjin, China **Jun. 2007**

### RESEARCH EXPERIENCES & APPOINTMENTS

- Assistant Professor of Physics,** **Aug. 2018~Present**  
**Georgia State University**
- Postdoctoral Research Associate** **Jan. 2016~Jun. 2018**  
**Dr. Kang L. Wang's Group, University of California, Los Angeles**
- Research Assistant** **Jan. 2011~Dec. 2015**  
**Dr. Pulickel M. Ajayan's Group, Rice University**
- Visiting Research Scholar** **Apr. 2013~Oct. 2013**  
**Dr. Aditya Mohite's Group, Los Alamos National Laboratory**
- Research Assistant** **Sep. 2007~Sep. 2010**  
**Dr. Zhigang Zou' Group (Eco-materials and Renewable Research Center), Nanjing University**

### SELECTED PUBLICATIONS

(\* corresponding author, + equal contribution)

- Shin-Hung Tsai+, **Sidong Lei**+\*, Xiaodan Zhu, Shiao-Po Tsai, Gen Yin, Xiaoyu Che, Peng Deng, Jimmy Ng, Xiang Zhang, Wei-Hsiang Lin, Zehua Jin, Hussam Qasem, Zhongpo Zhou, Robert Vajtai, Nai-Chang Yeh, Pulickel Ajayan, Ya-Hong Xie, Kang L Wang. “*Interfacial States and Fano–Feshbach Resonance in Graphene–Silicon Vertical Junction*” *Nano Letters*, 19(2019), 6765
- Prasanna D Patil, Sujoy Ghosh, Milinda Wasala, **Sidong Lei**, Robert Vajtai, Pulickel M Ajayan, Arindam Ghosh, Saikat Talapatra. “*Gate-Induced Metal–Insulator Transition in 2D van der Waals Layers of Copper Indium Selenide Based Field-Effect Transistors*” *ACS Nano*, 13(2019), 13413
- Prasanna D Patil, Sujoy Ghosh, Milinda Wasala, **Sidong Lei**, Robert Vajtai, Pulickel M Ajayan, Saikat Talapatra. “*Electric Double Layer Field-Effect Transistors Using Two-Dimensional (2D) Layers of Copper Indium Selenide (CuIn7Se11)*” *Electronics*, 8(2019), 645
- Xiaodan Zhu+, **Sidong Lei**+\*, Shin-Hung Tsai, Xiang Zhang, Jun Liu, Gen Yin, Min Tang, Carlos M. Torres Jr., Aryan Navabi, Zehua Jin, Shiao-Po Tsai, Hussam Qasem, Yong Wang, Robert Vajtai, Roger K.

- Lake, Pulickel M. Ajayan, and Kang L. Wang. "A Study of Vertical Transport through Graphene towards Control of Quantum Tunneling" *Nano Letters*, DOI: 10.1021/acs.nanolett.7b03221
- Gonglan Ye, Yongji Gong, **Sidong Lei**, Yongmin He, Bo Li, Xiang Zhang, Zehua Jin, Liangliang Dong, Jun Lou, Robert Vajtai, Wu Zhou, Pulickel M Ajayan. "Synthesis of large-scale atomic-layer SnS<sub>2</sub> through chemical vapor deposition" *Nano Research*, 10(2017), 2386
  - Mingyang Liu, Luqing Wang, Linan Zhou, **Sidong Lei**, Jarin Joyner, Yingchao Yang, Robert Vajtai, Pulickel Ajayan, Boris I Yakobson, Pol Spanos. "Characterization of tin (II) sulfide defects/vacancies and correlation with their photocurrent" *Nano Research*, 10(2017), 218
  - Michael KL Man, Athanasios Margiolakis, Skylar Deckoff-Jones, Takaaki Harada, E Laine Wong, M Bala Murali Krishna, Julien Madéo, Andrew Winchester, **Sidong Lei**, Robert Vajtai, Pulickel M Ajayan, Keshav M Dani. "Imaging the motion of electrons across semiconductor heterojunctions" *Nature Nanotechnology*, 12(2017), 36
  - **Sidong Lei**, Xifan Wang, Bo Li, Jiahao Kang, Yongmin He, Antony George, Liehui Ge, Yongji Gong, Pei Dong, Zehua Jin, Gustavo Brunetto, Weibing Chen, Zuan-Tao Lin, Robert Baines, Douglas S Galvão, Jun Lou, Enrique Barrera, Kaustav Banerjee, Robert Vajtai, Pulickel Ajayan. "Surface functionalization of two-dimensional metal chalcogenides by Lewis acid–base chemistry" *Nature Nanotechnology*, 11(2016), 465
  - Sina Najmaei+, **Sidong Lei**+, Robert A Burke, Barbara M Nichols, Antony George, Pulickel M Ajayan, Aaron D Franklin, Jun Lou, Madan Dubey. "Enabling ultrasensitive photo-detection through control of interface properties in molybdenum disulfide atomic layers" *Scientific Reports*, 6(2016), 39465
  - Bo Li, Yongji Gong, Zhili Hu, Gustavo Brunetto, Yingchao Yang, Gonglan Ye, Zhuhua Zhang, **Sidong Lei**, Zehua Jin, Elisabeth Bianco, Xiang Zhang, Weipeng Wang, Jun Lou, Douglas S Galvão, Ming Tang, Boris I Yakobson, Robert Vajtai, Pulickel M Ajayan. "Solid–vapor reaction growth of transition-metal dichalcogenide monolayers" *Angewandte Chemie*, 128(2016), 10814
  - Jingjie Wu, Zhili Hu, Zehua Jin, **Sidong Lei**, Hua Guo, Kuntal Chatterjee, Jing Zhang, Yingchao Yang, Bo Li, Yang Liu, Jiawei Lai, Robert Vajtai, Boris Yakobson, Ming Tang, Jun Lou, Pulickel M Ajayan. "Spiral growth of SnSe<sub>2</sub> crystals by chemical vapor deposition" *Advanced Materials Interfaces*, 3(2016), 1600383
  - Yongmin He, Ali Sobhani, **Sidong Lei**, Zhuhua Zhang, Yongji Gong, Zehua Jin, Wu Zhou, Yingchao Yang, Yuan Zhang, Xifan Wang, Boris Yakobson, Robert Vajtai, Naomi J Halas, Bo Li, Erqing Xie, Pulickel Ajayan. "Layer engineering of 2D semiconductor junctions" *Advanced Materials*, 28(2016), 5126
  - Gerard Cadafalch Gazquez, **Sidong Lei**, Antony George, Hemtej Gullapalli, Bernard A Boukamp, Pulickel M Ajayan, Johan E ten Elshof. "Low-cost, large-area, facile, and rapid fabrication of aligned ZnO nanowire device arrays" *ACS Applied Materials & Interfaces*, 8(2016), 13466
  - Yongji Gong, Gonglan Ye, **Sidong Lei**, Gang Shi, Yongmin He, Junhao Lin, Xiang Zhang, Robert Vajtai, Sokrates T Pantelides, Wu Zhou, Bo Li, Pulickel M Ajayan. "Synthesis of millimeter-scale transition metal dichalcogenides single crystals" *Advanced Functional Materials*, 26(2016), 2009
  - Xiaowei He, Weilu Gao, Lijuan Xie, Bo Li, Qi Zhang, **Sidong Lei**, John M Robinson, Erik H Hároz, Stephen K Doorn, Weipeng Wang, Robert Vajtai, Pulickel M Ajayan, W Wade Adams, Robert H Hauge, Junichiro Kono. "Wafer-scale monodomain films of spontaneously aligned single-walled carbon nanotubes" *Nature Nanotechnology*, 11(2016), 633
  - **Sidong Lei**, Fangfang Wen, Bo Li, Qizhong Wang, Yihan Huang, Yongji Gong, Yongmin He, Pei Dong, James Bellah, Antony George, Liehui Ge, Jun Lou, Naomi J. Halas, Robert Vajtai, Pulickel Ajayan. "Optoelectronic memory using two-dimensional materials" *Nano Letters*, 15(2015), 259 (Highlighted by *Nature Nanotechnology*)

- **Sidong Lei**, Fangfang Wen, Liehui Ge, Sina Najmaei, Antony George, Yongji Gong, Weilu Gao, Zehua Jin, Bo Li, Jun Lou, Junichiro Kono, Robert Vajtai, Pulickel Ajayan, and Naomi J. Halas. “*An atomically layered InSe avalanche photodetector*” *Nano Letters*, 15(2015), 3048
- Bo Li, Gang Shi, **Sidong Lei**, Yongmin He, Weilu Gao, Yongji Gong, Gonglan Ye, Wu Zhou, Kunttal Keyshar, Ji Hao, Pei Dong, Liehui Ge, Jun Lou, Junichiro Kono, Robert Vajtai, Pulickel M Ajayan. “*3D band diagram and photoexcitation of 2D–3D semiconductor heterojunctions*” *Nano Letters*, 15(2015), 5919
- Yongji Gong+, **Sidong Lei**+, Gonglan Ye, Bo Li, Yongmin He, Kunttal Keyshar, Xiang Zhang, Qizhong Wang, Jun Lou, Zheng Liu, Robert Vajtai, Wu Zhou, Pulickel M Ajayan. “*Two-step growth of two-dimensional WSe<sub>2</sub>/MoSe<sub>2</sub> heterostructures*” *Nano Letters*, 15(2015), 6135
- Bo Li, Yongmin He, **Sidong Lei**, Sina Najmaei, Yongji Gong, Xin Wang, Jing Zhang, Lulu Ma, Yingchao Yang, Sanghyun Hong, Ji Hao, Gang Shi, Antony George, Kunttal Keyshar, Xiang Zhang, Pei Dong, Liehui Ge, Robert Vajtai, Jun Lou, Yung Joon Jung, Pulickel M Ajayan. “*Scalable transfer of suspended two-dimensional single crystals*” *Nano Letters*, 15(2015), 5089
- Jiangtan Yuan, Sina Najmaei, Zhuhua Zhang, Jing Zhang, **Sidong Lei**, Pulickel M. Ajayan, Boris I Yakobson, Jun Lou. “*Photoluminescence quenching and charge transfer in artificial heterostacks of monolayer transition metal dichalcogenides and few-layer black phosphorus*” *ACS Nano*, 9(2015), 555
- Zehua Jin, Peter Owour, **Sidong Lei**, Liehui Ge. “*Graphene, graphene quantum dots and their applications in optoelectronics*” *Current Opinion in Colloid & Interface Science*, 20(2015), 439 (invited review)
- Hisato Yamaguchi, Jean-Christophe Blancon, Rajesh Koppera, **Sidong Lei**, Sina Najmaei, Benjamin D Mangum, Gautam Gupta, Pulickel M Ajayan, Jun Lou, Manish Chhowalla, Jared J Crochet, Aditya D Mohite. “*Spatially resolved photoexcited charge-carrier dynamics in phase-engineered monolayer MoS<sub>2</sub>*” *ACS Nano*, 9(2015), 840
- **Sidong Lei**, Ali Sobhani, Fangfang Wen, Antony George, Qizhong Wang, Yihan Huang, Pei Dong, Bo Li, Sina Najmaei, James Bellah, Gautam Gupta, Aditya Mohite, Liehui Ge, Jun Lou, Naomi J. Halas, Robert Vajtai, Pulickel Ajayan. “*Ternary CuIn<sub>7</sub>Se<sub>11</sub>: towards ultra-thin layered photodetectors and photovoltaic devices*” *Advanced Materials*, 26(2014), 7666
- **Sidong Lei**, Liehui Ge, Sina Najmaei, Antony George, Rajesh Koppera, Jun Lou, Manish Chhowalla, Hisato Yamaguchi, Gautam Gupta, Robert Vajtai, Aditya Mohite, Pulickel Ajayan “*Evolution of the electronic band structure and efficient photo-detection in atomic layers of InSe*” *ACS Nano*, 8 (2014), 1263
- Guoxiong Su, Viktor G Hadjiev, Phillip E Loya, Jing Zhang, **Sidong Lei**, Surendra Maharjan, Pei Dong, Pulickel M. Ajayan, Jun Lou, Haibing Peng “*Chemical vapor deposition of thin crystals of layered semiconductor SnS<sub>2</sub> for fast photodetection application*” *Nano Letters*, 15(2014), 506
- Yongji Gong, Junhao Lin, Xingli Wang, Gang Shi, **Sidong Lei**, Zhong Lin, Xiaolong Zou, Gonglan Ye, Robert Vajtai, Boris I Yakobson, Humberto Terrones, Mauricio Terrones, Beng Kang Tay, Jun Lou, Sokrates T Pantelides, Zheng Liu, Wu Zhou, Pulickel M Ajayan. “*Vertical and in-plane heterostructures from WS<sub>2</sub>/MoS<sub>2</sub> monolayers*” *Nature Materials*, 13(2014), 1135
- Liehui Ge, **Sidong Lei**, Amelia HC Hart, Guanhui Gao, Huma Jafry, Robert Vajtai, Pulickel M Ajayan. “*Synthesis and photocurrent of amorphous boron nanowires*” *Nanotechnology*, 25(2014), 335701
- **Sidong Lei**, Liehui Ge, Zheng Liu, Sina Najmaei, Gang Shi, Ge You, Jun Lou, Robert Vajtai, Pulickel Ajayan. “*Synthesis and photoresponse of large GaSe atomic layers*” *Nano Letters*, 13 (2013), 2777
- Zheng Liu, Lulu Ma, Gang Shi, Wu Zhou, Yongji Gong, **Sidong Lei**, Xuebei Yang, Jiangnan Zhang, Jingjiang Yu, Ken P Hackenberg, Aydin Babakhani, Juan-Carlos Idrobo, Robert Vajtai, Jun Lou, Pulickel M Ajayan. “*In-plane heterostructures of graphene and hexagonal boron nitride with controlled domain sizes*” *Nature Nanotechnology*, 8(2013), 119

- **Sidong Lei**, Yao Yao , Zhaosheng Li , Tao Yu, Zhigang Zou. “Design and theoretical analysis of resonance cavity for second-harmonic generation with high efficiency” *Applied Physics Letters*, 98 (2011), 031102
- **Sidong Lei**, Xueliang Zhang, Zhaosheng Li, Tao Yu, Zhigang Zou. “Enhancement in photoluminescence of  $\text{CaMoO}_4: \text{Eu}^{3+}$  through introducing  $\text{MVO}_4$  ( $M = \text{Y}$  or  $\text{Bi}$ )” *Journal of the Electrochemical Society*, 156 (2009), J367
- Yongji Gong, Junhao Lin, Xingli Wang, Gang Shi, **Sidong Lei**, Zhong Lin, Xiaolong Zou, Gonglan Ye, Robert Vajtai, Boris Yakobson, Humberto Terrones, Mauricio Terrones, Beng Kang Tay, Jun Lou, Sokrates Pantelides, Zheng Liu, Wu Zhou, Pulickel Ajayan. “Vertical and in-plane heterostructures from  $\text{WS}_2/\text{MoS}_2$  monolayers” *Nature Materials*, DOI: 10. 1038/nmat4091
- Guoxiong Su, Viktor G Hadjiev, Phillip E Loya, Jing Zhang, **Sidong Lei**, Surendra Maharjan, Pei Dong, Pulickel M. Ajayan, Jun Lou, Haibing Peng “Chemical vapor deposition of thin crystals of layered semiconductor  $\text{SnS}_2$  for fast photo-detection application” *Nano Letters*, 15(2015), 506
- Hisato Yamaguchi, Jean-Christophe Blancon, Rajesh Koppera, **Sidong Lei**, Sina Najmaei, Benjamin D Magnum, Gautam Gupta, Pulickel M Ajayan, Jun Lou, Manish Chhowalla, Jared J Crochet, Aditya D Mohite “Spatially resolved photo-excited charge carrier dynamics in phase-engineered monolayer  $\text{MoS}_2$ ” *ACS Nano* 9(2015), 840
- Sina Najmaei, Zheng Liu, Wu Zhou, Xiaolong Zou, Gang Shi, **Sidong Lei**, Boris I Yakobson, Juan-Carlos Idrobo, Pulickel M Ajayan, Jun Lou “Vapour phase growth and grain boundary structure of molybdenum disulphide atomic layers.” *Nature Materials*, 12 (2013), 754
- Zheng Liu, Lulu Ma, Gang Shi, Wu Zhou, Yongji Gong, **Sidong Lei**, Xuebei Yang, Jiangnan Zhang, Jingjiang Yu, Ken P Hackenberg, Aydin Babakhani, Juan-Carlos Idrobo, Robert Vajtai, Jun Lou, Pulickel M Ajayan “In-plane heterostructures of graphene and hexagonal boron nitride with controlled domain sizes” *Nature Nanotechnology*, 8 (2013), 119
- **Sidong Lei**, Yao Yao, Zhaosheng Li, Tao Yu, Zhigang Zou. “Design and theoretical analysis of resonant cavity for second-harmonic generation with high efficiency” *Applied Physics Letters*, 98(2011), 031102
- Yao Yao, **Sidong Lei**, Zhaosheng Li, Tao Yu, Zhigang Zou. “Enhancement luminescence in  $\text{NaIn}(\text{WO}_4)_2$  via bismuth doping” *Journal of The Electrochemical Society*, 157(2010), P63
- **Sidong Lei**, X Zhang, Z Li, T Yu, Z Zou “Enhancement in photoluminescence of  $\text{CaMoO}_4: \text{Eu}^{3+}$  through introducing  $\text{MVO}_4$  ( $M = \text{Y}$  or  $\text{Bi}$ )” *Journal of The Electrochemical Society*, 156(2009), J367

## LIST OF PATENTS

- “Charge Coupled Device Based on Atomically Layered van der Waals Solid State Film for Optoelectronic Memory and Image Capture” by **Sidong Lei**, Antony George, Bo Li, Liehui Ge, Robert Vajtai, Pulickel Ajayan. US patent , US9431565 B2
- “The Method of Synthesizing Rare Earth Doped  $\text{Li}_2\text{SrSiO}_4$ ” by Zhigang Zou, **Sidong Lei**, Xueliang Zhang, Zhaosheng Li, Mei Zhu. Patent of China, CN101348716 A
- “A New Rare Earth and Bi(III) Doped  $\text{Aln}(\text{WO}_4)_2$  Type Fluorescence Material” by Zhigang Zou, Yao Yao, **Sidong Lei**, Zhaosheng Li. Patent of China, CN101597492 A