Masoud Mahjouri-Samani
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Curriculum Vitae

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CURRENT POSITION

***Oak Ridge National Laboratory*, Oak Ridge, Tennessee**
Postdoctoral Research Associate, 2013-Present
Adviser: Dr. David B. Geohegan

EDUCATION

***University of Nebraska-Lincoln*, Lincoln, Nebraska**
PhD, Electrical Engineering, 2008-2013
Dissertation: Laser-controlled synthesis and manipulation of carbon nanotubes
Adviser: Prof. Yongfeng Lu
GPA: 3.96/4.0

BS, Electrical Engineering, 2004-2008
Emphasis: Control systems
GPA: 3.7/4.0

RESEARCH INTERESTS

- Controlling the synthesis, understanding the growth mechanisms, and investigating the properties of nanomaterials for applications in advanced functional devices.
- Investigating the synthesis of nanomaterials in highly nonequilibrium growth conditions.
- Studying laser-material interactions for spatiotemporal resolved studies of fundamental growth mechanisms of low-dimensional nanomaterials.
- In situ optical diagnostics and imaging of nanomaterial growth kinetics.
- Exploring the multi-scale functionalities of nanomaterials from nano- to meso-scale architectures for use in energy, optoelectronics, and sensing applications.
- Developing multi-laser-beam approaches for in situ synthesis, processing, and characterization of nanomaterials at several length scales.

RESEARCH EXPERIENCES

Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, 2013-Present
Postdoctoral Research Associate, advisor: Dr. David B. Geohegan
Laser-assisted synthesis and characterization of low-dimensional nanomaterials

- Studied laser-material interactions for controlled synthesis and understanding the growth mechanisms and properties of nanomaterials.
- Developed new laser-based techniques for controlled synthesis of two-dimensional (2D) monolayer metal chalcogenides.
- Designed and advanced synthesis techniques for controlled doping and alloying of 2D monolayer crystals.
- Studied the dopant- and defect-induced variations in optical properties of 2D metal chalcogenides.

- Developed a novel synthesis method for formation of periodic arrays of lateral heterojunctions within monolayer 2D semiconductors.
- Fabricated functional devices based on 2D layered semiconductors that revealed unique optoelectronic properties.
- Investigated the dynamics of laser vaporized plumes for controlled generation of atoms, ions, clusters and ultra-small nanoparticle as fundamental building blocks for the formation of meso-scale nanostructures.
- Studied nanoparticle interactions and incorporation into higher order architectures during pulsed laser deposition.

Department of Electrical Engineering, University of Nebraska-Lincoln, 2008-2013
Graduate Research Assistant, advisor: Prof. Yongfeng Lu.
Laser-assisted synthesis and characterization of carbon nanostructures

- Studied the growth mechanisms, properties, and applications of carbon nanotubes and graphene.
- Designed and built a laser-assisted chemical vapor deposition (LCVD) system for the growth and fabrication of carbon-based devices.
- Developed laser-based methods to control the growth location of carbon nanotubes.
- Investigated the effects of laser interactions with various kinds of carbon nanotubes for selective energy coupling.
- Developed a laser-based method to selectively remove metallic carbon nanotubes from device structures.
- Fabricated CNT-based field-effect transistors (CNTFETs) and characterized their electrical properties.
- Designed, fabricated, and characterized plasmonic-enhanced CNT-based IR bolometers.
- Collaborated in direct synthesis of graphene patterns on metal surfaces through a laser direct write technique.
- Collaborated on fabricating carbon-based supercapacitors using carbon nano-onions (CNOs) for high efficiency energy storage.
- Collaborated on fabricating and characterizing plasmonic structures for surface-enhanced Raman spectroscopy (SERS) using gold-coated carbon nanotubes.
- Involved in fabrication of wafer-scale growth of graphene on dielectric substrates.

TEACHING EXPERIENCES

Teaching Assistant: Electrical Engineering, University of Nebraska-Lincoln, 2010-2011.

- Elements of Electrical Engineering I Spring 2011
- Electronics & Circuits I Fall 2010
- Introduction to Electrical Engineering Lab I Fall 2010
- Introduction to Electrical Engineering Lab II Fall 2010

PROPOSAL WRITING

Actively involved in preparing a Field Work Proposal (FWP) for DOE-BES Materials Science and Engineering Division (MSED) program. (Accepted)

- "Growth Mechanisms and Controlled Synthesis of Nanomaterials" 2015.

PI in a user proposal at ORNL. (Accepted)

- "In Situ TEM Study for Understanding the Growth Kinetics of Two-Dimensional Transitional Metal Chalcogenides (GaSe) in a Confined Growth System," 2014.

Independently prepared two full NSF proposals

- "Infrared Photodetector Based on Diameter-Modulated Carbon Nanotubes" 2012.
- "Plasmonic-Enhanced Infrared Bolometers Based on Nanoantenna Arrays with Carbon Nanotube Feed-Gaps" 2013.

U.S. PATENT

- D. B. Geohegan, **M. Mahjouri-Samani**, C. M. Rouleau, A. A. Puretzky, Ming-Wei Ling, Kai Xiao, Kai Wang "Patterned Two-Dimensional Heterocrystals" Disclosure Number 201503565.

ADVISING GRADUATE STUDENTS

- Actively involved in mentoring and supervising the visiting graduate students and undergraduate interns at CNMS.
- In charge of advising a graduate student (Mengkun Tian at University of Tennessee-Knoxville) during his graduate studies.

AWARDS AND HONORS

- Press release for the research work on ultrathin electronics, 2015.
- Research paper was highlighted in DOE Office of Sciences, 2015.
- Paper was highlighted at ORNL Science and Discovery, Advanced Materials, 2014
- Third place in the Graduate Poster Competition at UNL, 2012
- Second place in the Graduate Poster Competition at UNL, 2011
- Cover page story in the Nanotechnology journal, 2010
- J. A. Woollam Fellowship, 2009-2010
- Graduate Recruiting Fellowship, 2008-2009
- The Undergraduate Creative Activities and Research Experiences (UCARE) scholarship, 2007-2008
- Invited member of Eta Kappa Nu, the national electrical engineering honor society, 2007
- McNair Fellowship 2006-2008
- Computer Science Engineering and Mathematic Scholarship (CSEMS) 2004-2008
- Holling Scholarship 2004-2008

PROFESSIONAL AND SYNERGISTIC ACTIVITIES

- *Reviewer:* ACS Nano, Nanoscale, Applied Physics Letter, Advanced Materials, Nanotechnology, Scientific Reports, etc. 2013-Present.
- *Session chair*" ICALEO, Nano 6, Advanced Laser Applications, 2015.

- *Outreach Activity:* Closely worked with the recruitment coordinators at the College of Engineering to arrange lab visits and give tours to more than 200 middle school and high school students, 2008-2013
- *Organizational activity*: Actively involved in student organizations for promoting cultural awareness, respect and equality of all human beings regardless of gender, race, color, beliefs, and nationality, 2008-2013.

PEER REVIEWED PUBLICATIONS

Citations as of February 21, 2016: 298, h-index: 11, i10-index: 13

M. Mahjouri-Samani, L. Liang, A. Oyedele, N. Cross, M. Tian, M. W. Lin, K. Wang, A. Boulesbaa, K. Wang, C. M. Rouleau, A. A. Puretzky, K. Xiao, G. Eres, G. Duscher, and D. B. Geohegan "Vacancy Induced Anomalies in Optical and Electrical Properties of Highly Se-Deficient $MoSe_2$ Monolayers" *In Progress.*

M. Mahjouri-Samani, M. W. Lin, K. Wang, A. R. Lupini, J. Lee, L. Basile, A. Boulesbaa, C. M. Rouleau, A. A. Puretzky, I. N. Ivanov, K. Xiao, M.Yoon, and D. B. Geohegan " Patterned Arrays of Lateral Heterojunctions within Monolayer 2D Semiconductors" *Nature Communications*, DOI:10.1038/ncomms8749 (2015). ***(First and Corresponding Author)***

M. Tian, **M. Mahjouri-Samani**, G. Eres, R. Sachan, M. Yoon, M. F. Chisholm, K. Wang, A. A. Puretzky, C. M. Rouleau, D. B. Geohegan and G. Duscher "Structure and Formation Mechanism of Black TiO_2 Nanoparticles", *ACS Nano*, DOI: 10.1021/acsnano.5b04712 (2015).

A. Boulesbaa, B. Huang, K. Wang, M. W. Lin, **M. Mahjouri-Samani**, C. Rouleau, K. Xiao, M. Yoon, B. Sumpter, A. A. Puretzky, and D. B. Geohegan "Observation of Two Distinct Negative Trions in Tungsten Disulfide Monolayers" *Phys. Rev. B.*, DOI: 10.1103/PhysRevB.00.005400 (2015).

A. A Puretzky, L. Liang, X. Li, K. Xiao, K. Wang, **M. Mahjouri-Samani**, L. Basile, J. Carlos Idrobo, B. G Sumpter, V. Meunier, D. B Geohegan "Low-Frequency Raman 'Fingerprints' of Two-Dimensional Metal Dichalcogenide Layer Stacking Configurations" *ACS Nano*, 9, 6333–6342 (2015).

Wei Xiong, Yunshen Zhou, Wenjia Hou, Lijia Jiang, **Masoud Mahjouri-Samani**, Jongbok Park, Xiangnan He, Yang Gao, Lisha Fan, Tommaso Baldacchini, Jean-Francois Silvain, Yongfeng Lu "Laser-based micro/nanofabrication in one, two and three dimensions" *Frontiers of Optoelectronics* 1-28 (2015).

M. Mahjouri-Samani, M. Tian, K. Wang, A. Boulesbaa, C. M. Rouleau, A. A. Puretzky, M. A. McGuire, K. Xiao, G. Eres, G. Duscher, and D. B. Geohegan "Digital Transfer Growth of Patterned 2D Metal Chalcogenides by Confined Nanoparticle Evaporation" *ACS Nano*, 8, 11567–11575 (2014). ***(First and Corresponding Author)***

M. Mahjouri-Samani, R. Gresback, M. Tian, K. Wang, A. A. Puretzky, C. M. Rouleau, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan "Pulsed Laser Deposition of Photoresponsive Two-Dimensional GaSe Nanosheet Networks" *Adv. Funct. Mater*. 24, 6365–6371 (2014). ***(First and Corresponding Author)***

L. Oakes, A. Westover, **M. Mahjouri-Samani**, S. Chatterjee, A. A Puretzky, C. Rouleau, D. B. Geohegan, C. L. Pint "Uniform, homogenous coatings of carbon nanohorns on arbitrary substrates from common solvents" *ACS Appl. Mater. Interfaces* 5, 13153-13160 (2013).

Y. Gao, Y. S. Zhou, W. Xiong, L .J. Jiang, **M. Mahjouri-samani**, P. Thirugnanam, X. Huang, M. M. Wang, L. Jiang, Y. F. Lu "Transparent, flexible, and solid-state supercapacitors based on graphene electrodes" *Appl. Phys. Lett*. 1, 012101 (2013).

M. Mahjouri-Samani, Y. S. Zhou, L. Fan, Y. Gao, W. Xiong, and Y. F. Lu " Laser-assisted solid-state synthesis of carbon nanotube/silicon core/shell structures " *Nanotechnology* 24, 255604 (2013).

P. Thirugnanam, W. Xiong, **M. Mahjouri-Samani**, L. Fan, R. Raju, M. Mitchell, Y. Gao, B. Krishnan, Y.S. Zhou, L. Jiang, Y.F. Lu "Rapid Growth of m-plane Oriented Gallium Nitride Nanoplates on Silicon Substrate Using Laser-Assisted Metal Organic Chemical Vapor Deposition" *Crystal Growth & Design*, 13, 3171-3176 (2013).

M. Mahjouri-Samani, Y. S. Zhou, X. N. He, W. Xiong, P. Hilger and Y. F. Lu "Plasmonic-Enhanced Carbon Nanotube Infrared Bolometers" *Nanotechnology* 24, 035502 (2013).

W. Xiong, Y. S. Zhou, L. J. Jiang, A. Sarkar, **M. Mahjouri-Samani**, Z. Q. Xie, Y. Gao, N. J. Ianno, L. Jiang, .Y. F. Lu, "Single-step formation of graphene on dielectric surfaces" *Adv. Mater*. 25, 630-634, (2012).

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, Z. Q. Xie, and Y. F. Lu "Strong Photoluminescence from Diameter-Modulated Single-Walled Carbon Nanotubes" *Appl. Phys. Lett*. 101, 043123 (2012).

X. N. He, Y. Gao, **M. Mahjouri-Samani**, P. N. Black, J. Allen, M. Mitchell, W. Xiong, Y. S. Zhou, L. Jiang and Y. F. Lu " Surface-enhanced Raman spectroscopy using gold-coated horizontally aligned carbon nanotubes" *Nanotechnology* 23, 205702 (2012).

W. Xiong, Y. S. Zhou, X.N. He, Y. Gao, **M. Mahjouri-Samani**, L. Jiang, T. Baldacchini and Y. F. Lu "Simultaneous additive and subtractive three-dimensional nanofabrication using integrated two-photon polymerization and multi-photon ablation" *Nature, Light: Science & Applications* **1**, e6,(2012).

Y. S. Zhou, W. Xiong, J. Park, M. Qian, **M. Mahjouri-Samani**, Y. Gao, L. Jiang, Y.F. Lu "Laser-assisted nanofabrication of carbon nanostructures" *J. Laser Appl*., 24, 042007 (2012).

J. B. Park, W. Xiong, Z. Q. Xie, Y. Gao , M. Qian, M. Mitchell, **M. Mahjouri-Samani**, Y. S. Zhou, L. Jiang, and Y. F. Lu "Transparent interconnections formed by rapid single-step fabrication of graphene patterns" *Appl. Phys. Lett*. 99, 053103 (2011).

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, Y. Gao, M. Mitchell, L. Jiang and Y. F. Lu "Diameter modulation by fast temperature control in laser-assisted chemical vapor deposition of single-walled carbon nanotubes" *Nanotechnology* 21 395601(2010). (***Cover Paper***)

Y.S. Zhou, W. Xiong, Y. Gao, **M. Mahjouri-Samani**, M. Mitchell, L. Jiang, and Y.F. Lu, "Towards Carbon-Nanotube Integrated Electronics: Optically Controlled Simultaneous Integration of Single-Walled Carbon Nanotubes" *Nanotechnology* Nanotechnology 21, 31560 (2010).

M. Masoud-Samani, Y. S. Zhou, W. Xiong, Y. Gao, M. Mitchell, and Y. F. Lu, "Laser-assisted selective removal of metallic carbon nanotubes" *Nanotechnology* 20, 495202 (2009).

W. Xiong, Y. S. Zhou, **M. Mahjouri-Samani**, W. Q. Yang, K. J. Yi, X. N. He, S. H. Liou, and Y. F. Lu, "Self-aligned growth of single walled carbon nanotubes using optical near-field effects", *Nanotechnology*, 20, 025601 (2009).

Y. S. Zhou, K. J. Yi**, M. Mahjouri-Samani**, W. Xiong, Y. F. Lu, and S. H. Liou, "Image contrast enhancement in field-emission scanning electron microscopy of single-walled carbon nanotubes", *Appl. Surf. Sci.* 255, 4341-4346 (2009).

Y. Gao, Y. S. Zhou, W. Xiong, **M. Mahjouri-Samani**, M. Mitchell, and Y. F. Lu, "Controlled growth of carbon nanotubes on electrodes under different bias polarity", *Appl. Phys. Lett*. 95, 143117 (2009).

CONFERENCE PRESENTATIONS AND POSTERS

M. Mahjouri-Samani, M. Tian, M-W Ling, A. Lupini, K. Wang, C. M. Rouleau, A. A. Puretzky, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan" Laser-based Synthesis and Processing of Two-dimensional Monolayers and Heterostructures" AVS 63rd 2016, Nashville, TN, USA. ***(Invited Talk)***

M. Mahjouri-Samani, L. Liang, A. Oyedele, N. Cross, M. Tian, M. W. Lin, K. Wang, A. Boulesbaa, K. Wang, C. M. Rouleau, A. A. Puretzky, K. Xiao, G. Eres, G. Duscher, and D. B. Geohegan "Synthesis and Properties of $MoSe_{2-x}$ Nanosheets with Controllable Se Deficiency" MRS Spring 2016, Phoenix, AR, USA.

M. Mahjouri-Samani, M. Tian, M-W Ling, A. Lupini, K. Wang, C. M. Rouleau, A. A. Puretzky, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan" Laser-Assisted Synthesis and Manipulation of Two-Dimensional Layered Semiconductors" Photonics West 2016, San Francisco, CA, USA. ***(Invited Talk)***

M. Mahjouri-Samani, M-W. Lin, K. Wang, A. R. Lupini, J. Lee, L. Basile, A. Boulesbaa, C. M. Rouleau, A. A. Puretzky, I. N. Ivanov, K. Xiao,[1] M. Yoon, and D. B. Geohegan "Synthesis of Patterned Arrays of Lateral Heterojunctions within Two-Dimensional Monolayer Crystals" MRS Fall 2015, Boston, MA, USA.

M. Mahjouri-Samani, M. Tian, K. Wang, C. M. Rouleau, A. A. Puretzkey, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan "Controlled Growth of Mono- and Few-Layer Two-Dimensional Metal Chalcogenides from Laser-Synthesized Nanoparticles" ICALEO 2015, Atlanta, GA, USA. ***(Invited Talk)***

M. Mahjouri-Samani, M. Tian, K. Wang, C. M. Rouleau, A. A. Puretzkey, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan "Controlled Growth of Two-Dimensional Layered Semiconductors from Laser-Synthesized Nanoparticles" COLA September 2015, Cairns, Australia.

M. Mahjouri-Samani, M. Tian, K. Wang, A. Boulesbaa, C. M. Rouleau, A. A. Puretzky, M. A. McGuire, B. R. Srijanto, K. Xiao, G. Eres, G. Duscher, and D. B. Geohegan "Digital Transfer Growth of Patterned 2D Metal Chalcogenides" MRS Spring 2015, San Francisco, CA, USA.

M. Mahjouri-Samani, R. Gresback, M. Tian, K. Wang, A. A. Puretzky, C. M. Rouleau, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan "Controlled Growth of 2D Metal Chalcogenides from Pulsed Laser Deposited Nanoparticles" Photonics West 2015, San Francisco, CA, USA.

M. Mahjouri-Samani, R. Gresback, M. Tian, K. Wang, A. A. Puretzky, C. M. Rouleau, G. Eres, I. N. Ivanov, K. Xiao, M. A. McGuire, G. Duscher, D. B. Geohegan "Pulsed Laser Deposition of Metal Chalcogenide Nanosheet Networks" MRS Fall 2014, Boston, MA, USA.

M. Mahjouri-Samani, D. B. Geohegan, A. A. Puretzky, C. M. Rouleau, G. Eres, M. Yoon, M. Chi, M. Tian, G. Duscher "Structural Evolution of Ultrasmall TiO_2 Nanoparticles into Mesoscale Architectures by Pulsed Laser Deposition" MRS Spring 2014, San Francisco, CA, USA.

M. Mahjouri-Samani, D. B. Geohegan, A. A. Puretzky, C. M. Rouleau, G. Eres, K. L. More, M. Chi, M. Tian, G. Duscher "Understanding the Formation of Nanostructures and Thin Films using Nanoparticles as Building Blocks in Pulsed Laser Deposition" Photonics West 2014, San Francisco, CA, USA.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, P. Hilger, and Y.F. Lu "Efficient laser coupling into plasmonic nanoantenna arrays for fabrication and characterization of sensitive IR bolometers" ICALEO 2012, Anaheim, CA, USA.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, M. Mitchell, and Y.F. Lu "Laser-Induced Growth of Diameter-Modulated Single-Walled Carbon Nanotubes" ICALEO 2011, Orlando, FL, USA.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong and Y. F. Lu "Laser-Assisted Periodic Diameter Modulation of Carbon Nanotubes Through Rapid Temperature Modulation" proceeding of LPM 2011, Japan.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, Y. Gao, M. Mitchell, and Y. F. Lu "Diameter modulation of carbon nanotubes by rapid temperature modulation in laser-assisted chemical vapor deposition" Photonics West 2011, San Francisco, CA, USA.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, Y. Gao, M. Mitchell, and Y. F. Lu "Growth of diameter-modulated single-walled carbon nanotubes through instant temperature modulation in laser-assisted chemical vapor deposition" MRS 2010, Boston, MA, USA.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, Y. Gao, M. Mitchell, and Y. F. Lu, "Laser-assisted selective removal of metallic carbon nanotubes" ICALEO 2009, Orlando, FL, USA.

M. Mahjouri-Samani, Y. S. Zhou, W. Xiong, Y.F. Lu, "Growth of self-aligned single-walled carbon nanotubes by laser-assisted chemical vapor deposition", Conference on Laser-Based Micro and Nano-Packaging and Assembly (LMP-V) in LASE 2008 (Photonics West 2008, Jan 19 – 24, 2008, San Jose, California, USA).

REFERENCES

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