

Hongsuk Nam

EDUCATION

University of Michigan

Ann Arbor, MI

- Ph.D. in Mechanical Engineering (Coursework: Plasma Physics) Aug. 2016
- M.S. in Electrical Engineering (Coursework: Solid State Physics) Apr. 2016
- M.S. in Mechanical Engineering (Coursework: Linear Algebra, Quantum Mechanics) Apr. 2013
 - Awarded merit-based scholarship by Government of South Korea

Seoul National University

Seoul, South Korea

- B.S. in Mechanical Engineering (Cum Laude, Coursework: Calculus, Engineering Mathematics) Aug. 2011

PROFESSIONAL SKILLS

- 5 years of nanofabrication process experiences with semiconducting materials (Wafer fabrication, Lithography, CVD, PVD, Bonding, Plasma etch, SEM, AFM, Wet benches)
- CAD (Solidworks, AutoCAD, 3D MAX, CATIA)
- Semiconductor Parameter Analyzer, Data Analysis/Simulation Tool (MATLAB, COMSOL Multiphysics)
- Language: English (Full professional proficiency), Korean (Native)

RESEARCH AND WORK EXPERIENCE

Lam Research Corporation

Fremont, CA

Product engineer

Mar. 2017 – Present

- Manages new product introduction and production support engineering for a semiconductor manufacturing equipment
- Interfaces with design, process, test, reliability and manufacturing engineering to solve product issues and production problems
- Develops and sustains process improvements to reduce production costs and increase yields

University of Michigan

Ann Arbor, MI

Postdoctoral researcher

Sep. 2016 – Feb. 2017

Graduate student research assistant

Jan. 2012 – Aug. 2016

Project: Nanoprinting Process for Nanoelectronic and Optoelectronic Devices and Heterostructures

- Developed plasma-assisted printing process for producing device arrays of thin-film materials
- Produced well-controlled edge profile and thickness suitable for scale-up electronic applications

Project: Field-effect Transistor Devices with Thin-film Materials

- Built ultrasensitive (fM-level limit of detection) electrical sensors with micro/nanofabrication techniques for chemical/gas/bio sensing applications
- Measured sensor signals with cryogenic probe station and semiconductor parameter analyzer
- Performed data analysis with MATLAB to identify trends and obtaining core results

Project: Plasmonic nanostructures for Optical Sensor Applications

- Designed new masks and jigs with Solidworks and AutoCAD for advanced optical measurement system followed with micro/macro machining
- Measured sensor signals with SERS (Surface Enhanced Raman Spectroscopy) and optical spectrometer

Project: Micro-valve Actuator for Optofluidic Biosensor Applications

- Designed and implemented a micro-valve system that increased the concentration of the target molecules by 3 times, resulting in the increase of sensitivity
- Proved the mechanism by simulation with COMSOL Multiphysics

- Published 13 papers in peer-reviewed journals (7 first authored)

- Two issued patents in US Patent and Trademark Office

Seoul National University

Seoul, South Korea

Student researcher

Sep. 2009 – Aug. 2011

Project: Alternating distribution and merging of droplets in a microfluidic device

- Designed novel microchannel system with pillar structure for droplet merging application
- Performed CFD (Computational Fluid Dynamics) analysis with COMSOL Multiphysics for applying hydrodynamic resistance model
- Created a powerful method of timing error correction of microfluidic logic device and synthesis of chemical materials

SOLiD Technologies

Seongnam, South Korea

Hardware engineer (Alternative civilian service)

Mar. 2006 – Jan. 2009

- Designed the enclosures of RF amplifier and optical networking solutions with Solidworks and AutoCAD
- Tested vibration/impact durability of the devices for evaluating reliability

List of Patents, Publications and Conference Talks

PATENT

- Xiaogan Liang, **Hongsuk Nam**, Sungjin Wi, and Mikai Chen, “Plasma-Assisted Techniques For Fabricating Semiconductor Devices”, US 20150255661, Issued (2015)
- Xiaogan Liang, **Hongsuk Nam**, Sungjin Wi, and Mikai Chen, “Field Effect Transistor Memory Device”, US 20170018561, Issued (2017)

JOURNAL PAPER

Hongsuk Nam†, Byunghoon Ryu†, Bo-Ram Oh, Yujing Song, Pengyu Chen, Younggeun Park, Wenjie Wan, Katsuo Kurabayashi, and Xiaogan Liang, “Cyclewise Operation of Printed MoS₂ Transistor Biosensors for Rapid Biomolecule Quantification at Femtomolar Levels,” ACS Sensors, 2 (2), 274-281 (2017)

Hongsuk Nam, Jeong Seop Yoon, Hiroto Izuoka, Bo-Ram Oh, Katsuo Kurabayashi, Wenjie Wan, and Xiaogan Liang, “Nanofluidic Flow Assisted Assembly of Dispersed Plasmonic Nanostructures into Shallow Nanochannel Sensors,” Journal of Vacuum Science and Technology B, 34, 06KM04 (2016)

Mikai Chen, **Hongsuk Nam**, Hossein Rokni, Sungjin Wi, Jeong Seop Yoon, Pengyu Chen, Katsuo Kurabayashi, Wei Lu, and Xiaogan Liang, “Nanoimprint-Assisted Shear Exfoliation (NASE) for Producing Multilayer MoS₂ Structures as Field-Effect Transistor Channel Arrays,” ACS Nano, 9 (9), 8773-8785 (2015)

Hongsuk Nam, Bo-Ram Oh, Mikai Chen, Sungjin Wi, Da Li, Katsuo Kurabayashi, and Xiaogan Liang, “Fabrication and Comparison of MoS₂ and WSe₂ Field-Effect Transistor Biosensors,” Journal of Vacuum Science and Technology B, 33, 06FG01 (2015)

Sungjin Wi, Mikai Chen, Da Li, **Hongsuk Nam**, Edgar Meyhofer, and Xiaogan Liang, “Photovoltaic Response in Pristine WSe₂ Layers Modulated by Metal-Induced Surface-Charge-Transfer Doping,” Applied Physics Letters, 107, 062102 (2015)

Hongsuk Nam, Bo-Ram Oh, Pengyu Chen, Jeong Seop Yoon, Sungjin Wi, Mikai Chen, Katsuo Kurabayashi, and Xiaogan Liang, “Two Different Device Physics Principles for Operating MoS₂ Transistor Biosensors with Femtomolar-Level Detection Limits,” Applied Physics Letters, 107, 012105 (2015)

Hongsuk Nam†, Bo-Ram Oh†, Pengyu Chen, Mikai Chen, Sungjin Wi, Wenjie Wan, Katsuo Kurabayashi, and Xiaogan Liang, “Multiple MoS₂ Transistors for Sensing Molecule Interaction Kinetics,” Scientific Reports, 5, 10546 (2015)

Sungjin Wi, Mikai Chen, **Hongsuk Nam**, Amy C. Liu, Edgar Meyhofer, and Xiaogan Liang, “High Blue-Near Ultraviolet Photodiode Response of Vertically Stacked Graphene-MoS₂-Metal Heterostructures”, Applied Physics Letters, 104, 232103/1-232103/5 (2014)

Sungjin Wi, Hyunsoo Kim, Mikai Chen, **Hongsuk Nam**, L. Jay Guo, Edgar Meyhofer, and Xiaogan Liang, “Enhancement of Photovoltaic Response in Multilayer MoS₂ Induced by Plasma Doping”, ACS Nano, 8 (5), 5270–5281 (2014)

Mikai Chen, **Hongsuk Nam**, Sungjin Wi, Greg Priessnitz, Ivan Manuel Gunawan, and Xiaogan Liang, “Multibit Data Storage States Formed in Plasma-Treated MoS₂ Transistors”, ACS Nano, 8, 4, 4023–4032 (2014)

Mikai Chen, Sungjin Wi, **Hongsuk Nam**, Greg Priessnitz, and Xiaogan Liang, “Effects of MoS₂ thickness and air humidity on transport characteristics of plasma-doped MoS₂ field-effect transistors”, Journal of Vacuum Science and Technology B, 32, 06FF02 (2014)

Hongsuk Nam†, Mikai Chen†, Sungjin Wi†, Lian Ji, Xin Ren, Lifeng Bian, Shulong Lu, and Xiaogan Liang, “Stable Few-Layer MoS₂ Diodes Formed by Plasma Doping”, Applied Physics Letters, 103,14, 142110/1-142110/4 (2013)

Hongsuk Nam †, S. Wi †, H. Rokni, M. Chen, G. Priessnitz, W. Lu, and X. Liang, “MoS₂ Transistors Fabricated via Plasma-assisted Nanoprinting of Few-layer-MoS₂ Flakes into Large-area Arrays”, ACS Nano, 7, 7, 5870-5881 (2013)

CONFERENCE TALK

Miniaturized Systems for Chemistry and Life Sciences (MicroTAS) Gyeongju, Korea (Oct 2015)

- Thesis title: Multiple MoS₂ Transistor-Integrated Microfluidic Biosensors for Quantifying Cancer-Related Biomarker Molecules with Femtomolar-Level Detection Limits
- Poster presentation

Electron, Ion, and Photon Beam technology and Nanofabrication (EIPBN) San Diego, USA (May 2015)

- Thesis title: Fabrication of Consistent MoS₂ Biosensors for Quantifying Cancer-Related Biomarker Molecules with Femtomolar-Level Detection Limit
- Oral talk

Electron, Ion, and Photon Beam technology and Nanofabrication (EIPBN) Nashville, USA (May 2013)

- Thesis title: MoS₂ Transistors Fabricated via Plasma-assisted Nanoprinting of Few-layer-MoS₂ Flakes into Large-area Arrays
- Oral talk