

# Xiabing LOU

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## Education & Research Experience

- 2011-2017 **PhD**, *Harvard University*, Chemistry. Atomic Layer Deposition of epitaxial high-k dielectric on Group III-V semiconductor devices.
- 2013-2015 **Second Field**, *Harvard University*, Energy Consortium. Studied economic benefits of energy storage devices, hybrid cars and environmental impacts of energy policies.
- 2007-2011 **Bachelor**, *Fudan University*, Chemistry, GPA: 3.63/4.00, Rank 3/88, Major GPA 3.91/4.00. Collaborating with SINOPEC Shanghai to develop novel gold catalyst for fine chemical production from crude oil.

## Work Experience

- 2018-now **Sr. Device Engineer**, *Cambridge Electronics, Inc.*, Leading ALD dielectric development on GaN based power switch devices.
- 2017-2018 **Business Analysis Manager**, *T-Mobile US, Inc.*, In charge of analyzing Telecom industry technology trend and support the leadership for 5G strategy roll-out

## Journals Reviewed

*Catalysis Science & Technology*  
*Thin Solid Films*  
*Physics Letters A*  
*Microscopy and Microanalysis*  
*Journal of Nanomaterials*

## Selected Publications and Conferences

**Xia-Bing Lou**, Hong Zhou, Sang Bok Kim, Sami Alghamdi, Xian Gong, Jun Feng, Xinwei Wang, Peide D. Ye, Roy G. Gordon\*, Epitaxial Growth of  $Mg_xCa_{1-x}O$  on GaN by Atomic Layer Deposition, *Nano Letters*, 2016, **16**, 7650–7654

**Xia-Bing Lou**, Lin He, Yue Qian, Yong-Mei Liu, Yong Cao\*, Kang-Nian Fan, Highly Chemo- and Regioselective Transfer Reduction of Aromatic Nitro Compounds using Ammonium Formate Catalyzed by Supported Gold Nanoparticles, *Advanced Synthesis and Catalysis*, 2011, **353**, 281–286

H. Zhou, **X. Lou**, et. al., DC and RF Performance of AlGaIn/GaN/SiC MOSHEMTs With Deep Sub-Micron T-Gates and Atomic Layer Epitaxy MgCaO as Gate Dielectric. *IEEE Electron Device Letters*, 2017, **38**, 1409-1412

H. Zhou, **X. Lou**, et. al., Enhancement-mode AlGaIn/GaN Fin-MOSHEMTs on Si substrate with atomic layer epitaxy MgCaO. *IEEE Electron Device Letters*, 2017, **38**, 1294-1297

J. Feng, **X. Lou**, et. al., Direct-Liquid-Evaporation Chemical Vapor Deposition of Nanocrystalline Cobalt Metal for Nanoscale Copper Interconnect Encapsulation. *ACS Applied Materials & Interfaces*, 2017, **9**, 10914-10920

S. Ren, M. A. Bhuiyan, J. Zhang, **X. Lou**, et. al., Total Ionizing Dose (TID) Effects in GaAs MOSFETs With La-Based Epitaxial Gate Dielectrics. *IEEE Transactions on Nuclear Science*, 2017, **64**, 164-169

**Xiabing Lou** and Roy G. Gordon\*, Epitaxial Growth of MgCaO on GaN by Atomic Layer Deposition *42nd International Symposium on Compound Semiconductors, 2015*, Santa Barbara, CA

H. Zhou, **X. Lou**, et. al., High Performance InAlN/GaN MOSHEMTs Enabled by Atomic Layer Epitaxy MgCaO as Gate Dielectric. *IEEE Electron Device Letters*, 2016, **37**, 556-559

Zhou, Hong; **Lou, Xiabing**; et. al., InAlN/GaN MOSHEMTs with High Drain Current of 2.3 A/mm High On/Off Ratio of 1012 and Low SS of 64 mV/dec Enabled by Atomic-Layer-Epitaxial MgCaO as Gate Dielectric, *Device Research Conference* (2015)1-2

Zhou, Hong, **Lou, Xiabing**, et. al., AlGaIn/GaN MOSHEMT on Si Substrate with High on/off Ratio and High Off-state Breakdown Voltage Enabled by Atomic Layer Epitaxial MgCaO as Gate Dielectric, *46th IEEE International Electron Devices Meeting* (2015)1-3

Zhang, Jingyun; **Lou, Xiabing**; Si, Mengwei; Wu, Heng; Shao, Jiayi; Manfra, Michael J.; Gordon, Roy G.; Ye, Peide D.\*, Inversion-mode GaAs wave-shaped field-effect transistor on GaAs (100) substrate, *Applied Physics Letters*, 2015, **106**, 073506.1-073506.4

Lin He, **Xia-Bing Lou**, Ji Ni, Yong-Mei Liu, Yong Cao\*, He-Yong He, Kang-Nian Fan, Efficient and Clean Gold-Catalyzed One-Pot Selective N-Alkylation of Amines with Alcohols, *Chemistry - A European Journal*, 2010, **16**, 13965-13969

Lin He, Feng-Jiao Yu, **Xia-Bing Lou**, Yong Cao\*, He-Yong He and Kang-Nian Fan, A novel gold-catalyzed chemoselective reduction of  $\alpha,\beta$ -unsaturated aldehydes using CO and H<sub>2</sub>O as the hydrogen source, *Chem. Commun.*, 2010, **46**, 1553-1555

Xinwei Wang, Omair I. Saadat, Bin Xi, **Xiabing Lou**, Richard J. Molnar, Tomás Palacios and Roy G. Gordon, Atomic layer deposition of Sc<sub>2</sub>O<sub>3</sub> for passivating AlGaIn/GaN high electron mobility transistor devices, *Applied Physics Letters*, 2012, **101**, 232109

**Patent #:** CN102086155A. A novel catalysis method for reduction synthesizing amine, alcohol, olefin and alkane with supported gold nano particles 2011.06.08

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## Awards and Honors

- 2014 & 2012 Excellent Teaching Award of Harvard University
- 2013-2015 Harvard University Center for The Environment Fellowship
- 2008-2010 National Scholarships of China (4 out of 122)
- 2009-2010 Excellent Student of Fudan University (5 out of 122)
- 2008-2009 National Scientific Base Scholarships

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## Projects

- MgCaO epitaxy Established an ALD epitaxial growth method of MgCaO film on GaN substrate. MgCaO is serving as a high-k dielectric material for GaN based HEMT devices which is potentially applicable in next generation power inverter and electrical vehicles.

- La<sub>2</sub>O<sub>3</sub> Epitaxy Designed epitaxial La<sub>2</sub>O<sub>3</sub> ALD growth method for both GaAs(111) and GaAs(100) surfaces. In GaAs(100) surface, (111) surface was exposed by etching the surface into a "W" shape fin structure. Therefore, the challenge of growing La<sub>2</sub>O<sub>3</sub> epitaxy on GaAs(100) is solved.
- Building Reactor Design and construction of two different ALD reactors. Each reactor has 8 different precursor sources and the combination provide the capability for a variety of material including WN, La<sub>2</sub>O<sub>3</sub>, MgCaO, Al<sub>2</sub>O<sub>3</sub>, etc. The systems are controlled by embedded systems (arduino and raspberry Pi) and the software was written with Python by myself.
- TEM analysis software Wrote a software to analyze TEM diffraction pattern. The software is written with Matlab and Python, and provides the capability of converting the image pattern into lattice constant data
- Energy Storage Economics Built a model to analyze the economic potential of energy storage devices(like Tesla Power Wall and flow battery) in both US(low renewable energy) and Germany (high renewable energy) market. By assuming a deregulated electricity market, the potential of energy storage device in Germany can break even in 7 years by arbitraging the fluctuation of electricity prices, while in US it takes 20 years.

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## Skills

- Technology Transmission Electron Microscopy, X-ray Diffraction Crystallography, Atom Probe Tomography, Designing and constructing Atomic Layer Deposition systems, X-ray photoelectron spectroscopy , Fast Fourier Transform Infrared, Photo and E-beam lithography, Metrology, Focused Ion Beam
- Computer systems and Programing Expert in Linux system. Proficient with MS office software and Matlab. Experienced in Latex, html, C++ and Python.