

Lifeng Liu

Personal Information

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Scientific name in ISI Web of Science: Liu LF (Liu L for few papers)

Researcher ID: A-2522-2012 **Orcid ID:** 0000-0003-2732-7399

Google Scholar profile:

<https://scholar.google.com/citations?user=OOMBgkkAAAAJ&hl=it>

Postal Address:

International Iberian Nanotechnology Laboratory (INL), Av. Mestre Jose Veiga, s/n, 4715-330 Braga, Portugal

Professional Experience

April 2011 – present: Senior Staff Researcher, Principal Investigator, Group Leader

International Iberian Nanotechnology Laboratory (INL), Braga, Portugal

Leader of the Group NES-C: *Nanomaterials for energy storage and conversion*

May 2010 – April 2011: Staff Scientist, Group Head

Max Planck Institute of Microstructure Physics, Halle, Germany

Project: *One-dimensional nanomaterials for energy storage and conversion*

May 2007 – April 2010: Postdoctoral Fellow (Group Head since August 2009)

Max Planck Institute of Microstructure Physics, Halle, Germany

Project: *Complex nanostructures based on ordered porous alumina template*

Supervisor: Prof. Ulrich M. Gösele (†Dec. 9th, 2009)

Academic Qualifications

Sept. 2004 – May 2007: PhD in Condensed Matter Physics

The Institute of Physics, Chinese Academy of Sciences, Beijing, China

Title of Thesis: *Template synthesis, characterization and physical properties of quasi one-dimensional compound nanomaterials and complex nanostructures*

Supervisor: Prof. Sishen Xie (Fellow of Chinese Academy of Sciences and the Academy of Sciences of the Developing World)

Sept. 2001 – Aug. 2004: Msc in Condensed Matter Physics

The Institute of Physics, Chinese Academy of Sciences, Beijing, China

Title of Thesis: *Template synthesis and optical properties of open-at-both-ends carbon nanotube arrays*

Supervisor: Prof. Sishen Xie

Sept. 1997 – Jul. 2001: B. S. in Applied Physics

Beijing Jiaotong University (original Northern Jiaotong University), Beijing, China

Title of Thesis: *Application of finite element analysis to light propagation in slab waveguides*

Supervisor: Prof. Liu Wu & Prof. Jian Wang

Current Research Interest

- Nanomaterials for high-performance Li/Na-ion batteries and supercapacitors.
- Solar Fuel production.
- Nanostructured materials for electrocatalysis and photocatalysis.
- Nanostructured solar cells.
- Fundamental electrochemical and photoelectrochemical properties of nanomaterials.

Past Research Experience

- Photocatalysis based on TiO₂ nanostructures.
- Fabrication of TiO₂ nanotubes by electrochemical anodization and chalcogenide/TiO₂ core-shell nanostructures for photovoltaics.
- Nanoscale phase transitions and solid-state reaction.
- Metal chalcogenide nanostructures and their resistive switching properties.
- Fabrication, characterization, electrocatalysis and electrochemical sensing properties of nanoporous noble metal (Pt and Au) and alloy (PtCo, PtNi, PtRuCoNi, etc.) nanowires.
- Template-assisted electrodeposition of a variety of nanowires or nanotubes, including metals (Au, Ag, Pt, Cu, Ni, Co, Fe and Zn), alloys (NiZn, CoCu, CoPt, CoAu, AuAg, PtRuCoNi, PtCuCoNi), oxides (ZnO) and polymers (PEDOT and Ppy).
- Electrochemical anodization of aluminum (mild anodization, hard anodization and pulsed anodization) and titanium.
- Fabrication of noble metal nanoparticle chains by combining template-assisted electrodeposition with Kirkendall effect or Rayleigh instability and their structural characterization.
- Synthesis of oxide nanotubes (TiO₂, SiO₂, SnO₂, etc.) and oxide/metal

nanocables by template-based atomic layer deposition (ALD) and electrodeposition.

- Fabrication, phase transformation and electrical properties of superionic conductor (i.e. AgI, Ag₂S) nanowires.
- Template-assisted sol-gel synthesis, structures and ferroelectric properties of PbTiO₃, BiFeO₃ and BiMnO₃ nanotube arrays.
- Preparation of ferromagnetic/nonmagnetic multilayered nanowires (Co/Pt, Co/Au, Ni/Pt, etc.) via template-assisted pulse electrodeposition, and their microstructures as well as magnetic properties.
- Preparation of ferromagnetic-nonmagnetic alloy nanowires and nanotubes (NiZn, CoCu, CoPt, etc.) via template-assisted electrodeposition, and their microstructures, magnetism and magneto-transport properties.
- Developing a general approach to fabricating metal-carbon nanotubes core-shell heterostructures. A series of metallic (Fe, Pt Au, Cu, etc.) nanowires filled CNTs heterostructures were prepared.
- Preparation of open-at-both-ends CNTs array via template-based vapor deposition polymerization method. Investigating the transport behavior of soft X-ray in the CNT arrays at Beijing Synchrotron Radiation Facility.

Past Collaborative Research

- Fabrication of magnetic and ferroelectric nanodot arrays by pulse laser deposition using ultrathin porous alumina membrane as shadow masks.
- Metal-assisted (electro)chemical etching of silicon.
- CVD growth of single-walled carbon nanotubes.
- Preparation and characterization of semiconducting nanowires, nanotubes and nanobelts.
- Solution phase synthesis of metal nanoparticles.

Hands-on Experience

- **Materials synthesis techniques:**
Electrochemical Deposition, Chemical Vapor Deposition (CVD), Physical Vapor Deposition (PVD), Electrochemical Anodization, Metal-assisted Etching, Sol-gel Synthesis, Thermal Evaporation, Sputtering, Electrospinning, Hydrothermal synthesis, Atomic Layer Deposition (ALD), etc.
- **Materials characterizations and property measurements:**
Full operation of SEM (Hitachi S5200, JEOL 6701F, FEI Quanta 650), TEM including EDX, linescan and elemental mapping (JEOL 1010, Philips CM20FEG, FEI Titan ChemiSTEM 80-200) and XRD (Riguka, Philips X'pert).

Full operation of electrochemical workstations and battery testers (PAR 263A & VersaSTAT4, Biologic VMP3, MTI-8, Zahner). Proficient in a number of electrochemical test techniques such as cyclic voltammetry, chronoamperometry, potentiodynamic polarization, open-circuit potential, EIS, GPCL, PEIS and Tafel plot. Familiar with the use of rotating disk/ring-disk electrode, the fabrication of lithium-ion coin cells and the evaluation of electrocatalysts, lithium-ion batteries and supercapacitors.

Full operation of PPMS and SQUID for magnetic measurements.

Familiar with TGA, DTA, XPS, synchrotron radiation-based X-ray measurements, UV-vis spectroscopy, Raman spectroscopy, photoluminescence, surface area analyzer, field-emission measurements and four-probe electrical measurements.

Proficient in characterization techniques of solar cells and photoelectrochemical cells, such as QE/IPCE, I-V measurements, Mott-Schottky analysis, and IMPS/IMVS spectroscopy.

➤ **Clean room:**

Photolithography, Electron-beam lithography (Raith 150), Nanosphere lithography and lift-off procedures.

Honors and Awards

- FCT Investigator grant 2014 (ranked 3rd among 1400+ applicants)
- FCT Travel Grant, 2015
- Young Research Prize 2015, the Portuguese Electrochemical Society
- Best Poster Awards, International Summer School on CO₂ Conversion, Switzerland, 2016
- INL Awards for Professional Services 2016
- Prof. Rudolph A. Marcus (Noble Prize Laureate) Award 2017

Graduates and Postdocs Mentored

Present:

Meirong Yi (Visiting PhD student from Tsinghua University, China)

Project: Synthesis and characterization of molybdenum disulfide nanostructures

Isilda Amorim (Master student, INL)

Project: Silicon-based photocathodes for solar hydrogen evolution (Funded by FCT project "SiTMP4SolarH2")

Dr. Junyuan Xu (Postdoc, INL)

Project: Transition metal-based electrocatalysts for PEM water electrolysis (Funded by EU project "CritCat")

Dr. Thalluri Mouli (Postdoc, INL)

Project: Silicon-based photocathodes for solar hydrogen evolution (Funded by FCT project "SiTMP4SolarH2")

Balaji Sompalle (Co-Supervised PhD student at University of Minho)

Project: Silicon based photoelectrodes coupled with earth-abundant catalysts for photoelectrochemical water splitting (Partially funded by FCT project "SiTMP4SolarH2")

Dr. Dehua Xiong (COFUND Postdoc, INL)

Project: Photoelectrochemical and electrochemical water splitting

Past:

Dr. Wei Li (COFUND Postdoc, INL)

Project: Metal phosphide nanostructures for electrocatalysis

Joana Cerdeira (Summer student, from University of New Lisbon, July – September, 2016)

Project: Hydrothermal synthesis of transition metal hydroxide nanostructures for use in electrochemical oxygen evolution

Sofia Teixeira (Summer student, from University of Porto, July – September, 2016)

Project: Preparation of metal phosphide and selenide nanostructures to catalyze water splitting

Dr. Xiaoguang Wang (COFUND Postdoc, INL, May 2014 – April 2016)

Project: Non-Pt based electrocatalysts for hydrogen evolution and oxygen reduction reactions

Dr. Xiaoqing Bao (Postdoc, INL, Dec. 2011 - May 2015)

Project: Photoelectrochemical properties of silicon nanostructures fabricated by metal assisted etching

Dr. Manab Kundu (Postdoc, INL, Dec. 2011 – Nov. 2014)

Project: nanomaterials for lithium-ion batteries

Dr. Thomas LaTempa (Postdoc, INL, Feb. 2012 – Jan. 2013)

Project: Photoelectrochemical cells and photocatalysis

Teasha Fitztham (Summer student, from Massachusetts Institute of Technology, Jun. – Aug. 2012)

Project: Fabrication of vertically aligned TiO₂ nanotube arrays

Dr. Daoai Wang Postdoctoral fellow, Max Planck Institute of Microstructure Physics Dec. 2009 – Nov. 2010

Project: Fabrication, structure and photo- and electro- catalytic properties of TiO₂ nanostructures

Dr. Grzegorz Sulka (Jagiellonian University, Poland):

Visiting scientist Aug. 2008 – Oct. 2008

Project: Pulse anodization of aluminum

Geun-Sang Cho (Ecole Polytechnique, France):

Visiting master student Apr. 2008 – Jul. 2008

Project: Fabrication of porous alumina membranes

Seung-Woo Lee (Korean Institute of Machinery and Materials, Korea):

Visiting PhD student Aug. 2007 – Jan. 2008

Project: Fabrication, characterization and superionic conductivity of AgI nanowires

Leandro Gonzalez Rovira (Universidad de Cádiz, Spain):

Visiting PhD student Jul. 2007 – Oct. 2007

Project: Preparation of porous alumina membranes and electrochemical deposition of conducting polymer nanowires using AAO as templates

Research Grants/Funds As a Coordinator/PI

1. INL Start-Up Fund

Source: European Regional Development Fund, ON2.2 (Norte-07-0162-Feder-000045)

Start and end dates: Apr. 2011 – Mar. 2015

Value: 625,730 Euros

2. FCT Investigator, Development Grant

Source: the Portuguese Foundation of Science & Technology (FCT)

Grant No. (acronym): IF/01595/2014

Start and end dates: Apr. 2015 – Mar. 2020

Value: 192,000 Euros

3. FCT R&D project

Source: the Portuguese Foundation of Science & Technology (FCT)

Grant No. (acronym): PTDC/CTM-ENE/2349/2014 (SiTMP4SolarH2)

Start and end dates: July 2016 – June 2018

Value: 168,836 Euros

4. European Union H2020 Project

Source: European Commission

Grant No.: 686053 (CritCat)

Start and end dates: June 2016 – May 2019

Value: 474,090 Euros

5. FCT Exploratory Project

Source: the Portuguese Foundation of Science & Technology (FCT)

Grant No. (acronym): IF/01595/2014/CP1247/CT0001

Start and end dates: Jul.2016 – Jun. 2018

Value: 50,000 Euros

6. Sino-Portugal Bilateral Collaboration Programme

Source: the Portuguese Foundation of Science & Technology (FCT)

Chinese Partner: Prof. Liang Qiao at Fudan University

Start and end dates: Jan. 2017 – Dec. 2018

Value: 14,400 Euros

Research Grants/Funds As a Participant

1. ON.2 – O Novo Norte – The North Regional Operational Programme, 2012-2014, 664,000 Euros (Grant no. SAESCTN-PIIC&DT/1/2011)

“Integrated Hybrid Microsystems and Nanodevices”

2. ON.2 – O Novo Norte – The North Regional Operational Programme, 2012-2014, 870,315 Euros (Grant no. SAESCTN-PIIC&DT/1/2011)

“Lab on chip and microsystem platforms for biomedical, food, and environmental applications”

3. The National Basic Research Programme (973 Programme), The Ministry of Science and Technology, China (Grant No. 2005CB623602)

“Structure, Properties and Size Effect of One-Dimensional Nanomaterials”

Participated as a PhD student (Jan. 2005 – May 2007)

4. Natural Science Foundation Programme, NSF, China (Grant no. 10334060)

“Controlled Synthesis of One-Dimensional Nanomaterials”

Participated as a Master student (Sept. 2002 – Dec. 2004)

Professional and Community Services

Invited reviewer for international peer-reviewed journals (>60 journals, 300+ papers):

ACS Nano
Angewandte Chemie Int. Ed.
Analytical Chemistry
Applied Physics Letters
Advanced Functional Materials
ACS Applied Materials & Interfaces
ACS Sustainable Chemistry & Engineering
Advances in Physics: X
Bulletin of the Chemical Society of Ethiopia
Catalysis Letters
Chemical Communications
Chemistry-A European Journal
Chemical Vapor deposition
ChemSusChem
ChemNanoMat
Central European Journal of Chemistry
Dalton Transactions
Electrochemical and Solid-State Letters
European Journal of Inorganic Chemistry
Industrial & Engineering Chem. Res.
International Journal of Hydrogen Energy
Journal of New Materials for Electrochemical Systems
Journal of Physics D: Applied Physics
Journal of Nanoparticle Research
Journal of Magnetism and Magnetic Materials
Journal of the American Chemical Society
Journal of Micromechanics and Microengineering
Journal of Power Sources
Journal of Nanoscience Letters
Materials Letters
Materials Chemistry and Physics
New Journal of Chemistry
MRS Spring Meeting Proceedings
Nanotechnology
Nature Communications
Physica Status Solidi B
RSC Advances
Physical Chemistry Chemical Physics

Advanced Materials
Applied Physics A
Chemistry Letters
Applied Surface Science
Advanced Energy Materials
Catalysis Science & Technology
ChemElectroChem
Chemical Engineering Journal
Current Nanoscience
ChemPlusChem
Chemical Science
Chinese Journal of Chemistry
Ceramics International
Electrochimica Acta
Langmuir
Energy Technology
Journal of Physical Chemistry
Journal of Materials Chemistry
Journal of Solid State Electrochemistry
Materials & Design
Nano Energy
Scientific Reports
Materials Research Bulletin
Nanoscale
Journal of Physical Chemistry Letters
Recent Patents on Corrosion Science
Journal of Nanoscience & Nanotechnology
Small

Sustainable Energy & Fuels
Solid State Science

ScienceJet
Sensors

Invited reviewer for book chapters/books:

Wiley VCH publication: "Nanowires and Nanotubes"

Invited reviewer for research grant applications

National Engineering and Research Council of Canada
Research Grants Council of HongKong
Croatian Science Foundation
Competitive Research Grants, King Abdullah University of Science and Technology (KAUST)

Invited external examiner/jury member for PhD thesis

National University of Singapore
University of Porto (main examiner)
University of Aveiro

Membership of Organizing/Scientific Committee of International Conferences

1. The 7th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications, June 17-20, 2012, Porto, Portugal (**National Organizing Committee**)

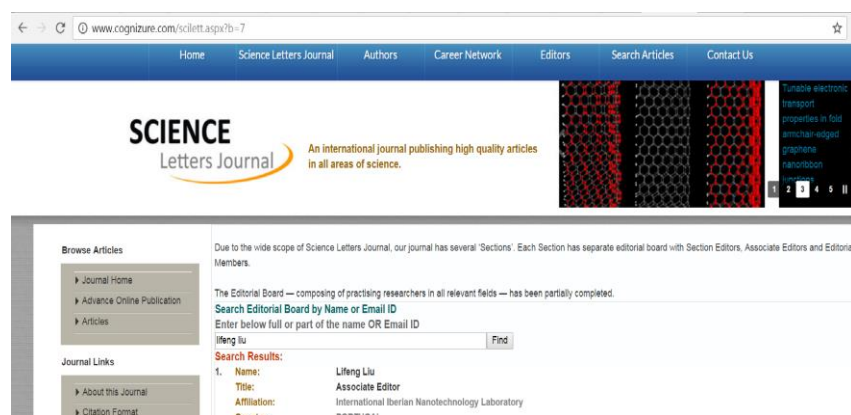
2. The 18th Meeting of Portuguese Electrochemical Society, March 25-27, 2013, Porto, Portugal (**Scientific Committee**)
<http://www.fc.up.pt/18spe/loc.html>

3. The 4th International Symposium on Surface Imaging/Spectroscopy at the Solid/Liquid Interface, September 2-4, 2015, Cracow, Poland (**Scientific Committee**) <http://issis2015.krakow.pl/page5.html>

4. The 20th Annual Meeting of the Portuguese Electrochemical Society, October 21-23, 2015, Braga, Portugal (**Scientific Committee**)
<http://www.quimica.uminho.pt/Default.aspx?tabid=4&pageid=473&lang=pt-PT>

Member of Editorial Board

Associate Editor of *Journal of Nanoscience Letters* (2012-2014)
Associate Editor of *Science Letters Journal* (2015 onwards)



Advances in Nano Research (since 2016)

<http://www.techno-press.org/?journal=anr&subpage=1#>

Journal of Nanomaterials Science (since 2016)

<http://www.journalofnanomaterialsscience.com/about-us.php>

Science Advances Today (since 2016)

<http://www.lognor.com/scienceadvances today.aspx?page=3&list=1>

Patents Filed/Approved

1. “Method of manufacturing of a porous electrode material”

X.G. Wang, Y.V. Kolen'ko, X.Q. Bao, **Lifeng Liu**

Provisional patent number: EP15162094.5, filed on Mar. 31, 2015

2. “Electrode material”

X. G. Wang, **Lifeng Liu**

Provisional patent number: EP15195667.9, filed on Nov 20, 2015

3. “Method of manufacturing of a porous electrode material”

X.G. Wang, Y.V. Kolen'ko, X.Q. Bao, W. Li, **Lifeng Liu**

Provisional patent number: PCT/EP2016/057010, filed on Apr. 1, 2016

4. “Water electrolyzer”

Xiaoguang Wang, **Lifeng Liu**

Provisional patent number: PCT/EP2016/076386, filed on Nov. 2, 2016

Selected Publications

Book Chapters

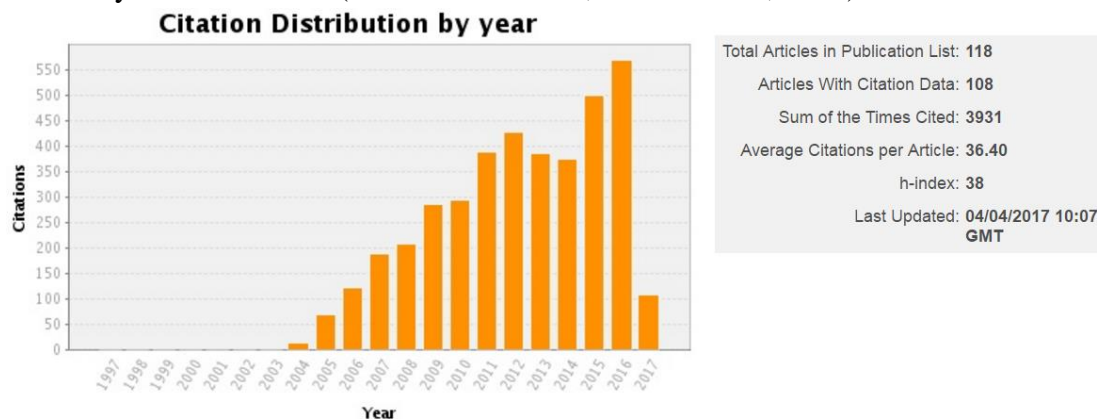
1. “Atomic layer deposition of electrocatalysts for use in fuel cells and electrolyzers”

Lifeng Liu*

Chapter 5 in the book “Atomic layer deposition for energy conversion applications” (ISBN: 978-3-527-33912-9), Editor: Julien Bachmann, John Wiley & Sons, Inc. **May 2017**

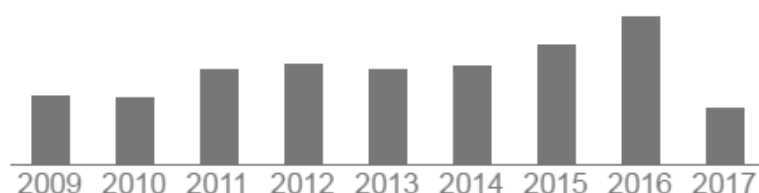
Peer-reviewed papers:

Summary of track-record (ISI web of science, as of Feb. 24, 2017)



Google Scholar citation metrics (as of Feb. 24, 2017)

Citation indices	All	Since 2012
Citations	5036	3084
h-index	41	31
i10-index	84	65

**2017**

1. D.H. Xiong, Q.Q. Zhang, W. Li, J. J. Li, X.L. Fu, M. F. Cerqueira, P. Alpuim, **Lifeng Liu***, “Atomic-layer-deposited ultrafine MoS₂ nanocrystals on cobalt foam for efficient and stable electrochemical oxygen evolution” *Nanoscale* **2017**, 9, 2711-2717.
2. W. Li, X. F. Gao, D. H. Xiong, F. Wei, W. G. Song, **Lifeng Liu***, “One-pot synthesis of thin Co₃Se₄ nanowires on cobalt foam for oxygen evolution and overall water splitting with high efficiency and extraordinary stability” *Adv. Energy Mater.* DOI: 10.1002/aenm.201602579
3. W. Li, X. F. Gao, D. H. Xiong, F. Xia, J. Liu, W. G. Song, J. Y. Xu, S. M. Thalluri, X. L. Fu, **Lifeng Liu***, “Vapor-solid synthesis of monolithic single-crystalline CoP nanowire electrodes for efficient and robust water

- electrolysis" *Chem. Sci.* **2017**, 8, 2952.
4. Shaozhan Huang*, Lin Zhang*, X.L. Lu, Lifeng Liu, L. X. Liu, X.L. Sun, Y. Yin, S. Oswald, F. Ding, O. G. Schmidt, "Tunable pseudocapacitance in 3D Ti³⁺ self-doped TiO₂ nanomembranes enabling superior lithium storage performance" *ACS Nano* **2017** 11, 821
 5. W. Li, D. H. Xiong, Lifeng Liu* "Self-Supported Co-Ni-P ternary nanowire electrodes for highly efficient and stable electrocatalytic hydrogen evolution in acidic solution" *Catalysis Today* **2017**, 287, 122-129.
 6. D. H. Xiong, W. Li, Lifeng Liu*, "Vertically-aligned porous Ni(OH)₂ nanosheets supported on carbon paper with long-term oxygen evolution performance superior to RuO₂ nanocatalysts" *Chem Asian J.* **2017** 12, 543.

2016

7. M. Kundu, Lifeng Liu* "Easy fabrication of nanohybrids comprising Co₃O₄ nanoparticles on electrospun carbon nanofibers for use as binder-free lithium-ion battery anodes" *Sci. Adv. Today* **2016**, 2, 25252.
8. W. Li, X. F. Gao, X. G. Wang, D. H. Xiong, P. P. Huang, W. G. Song, Lifeng Liu,* "Self-supported bifunctional Co-Ni-P nanowire electrode for overall water splitting with extraordinary efficiency and stability" *J. Power Sources* **2016**, 330, 156-166.
9. C. Y. Wu, W. Huang, Lifeng Liu, H. Wang, Y. W. Zeng, J. Xie, C. H. Jin, Z. Zhang, "Synthesis and phase transformation of hierarchical structure LiFePO₄ for Li-ion Battery" *CrystEngComm* **2016**, 18, 7707.
10. D. H. Xiong, W. Li, X. G. Wang, Lifeng Liu,* "Surface passivation of hematite photoanodes with a phosphorus overlayer for enhanced photoelectrochemical water oxidation" *Nanotechnology* **2016**, 27, 375401.
11. D. H. Xiong, X. G. Wang, W. Li, Lifeng Liu,* "Facile synthesis of iron phosphide nanorods for efficient and durable electrochemical oxygen evolution" *Chem. Commun.* **2016**, 52, 8711-8714.
12. Joao Nunes-Pereira, Manab, Kundu, Attila Goren, Maria M. Silva, Lifeng Liu, Senentxu Lanceros-Mendez,* "Effect of filler type on poly(vinylidene fluoride-co-trifluoroethylene) based composite separator membranes on Li-ion battery performance" *Composites Part B* **2016**, 96, 94-102.
13. W. Li, X. G. Wang, D. H. Xiong, Lifeng Liu,* "Efficient and durable electrochemical hydrogen evolution using cocoon-like MoS₂ with preferentially exposed edges" *Int. J. Hydrogen Energy* **2016**, 41, 9344-9354.
14. X. G. Wang, W. Li, D. H. Xiong, Lifeng Liu,* "Fast fabrication of self-supported macroporous electrodes composed of nickel phosphide micro-/nano-hybrids for efficient oxygen evolution and overall electrochemical water splitting" *J. Mater. Chem. A* **2016**, 4, 5639.
15. X. G. Wang, W. Li, D. H. Xiong, D. Y. Petrovykh, Lifeng Liu,* "Efficient and stable overall electrochemical water splitting using self-supported carbon

paper electrodes integrated with bi-functional nickel phosphide catalysts”
Adv. Funct. Mater. **2016**, 26, 4067-4077. (highlighted as Frontispiece)

2015

16. R. E. Sousa, M. Kundu, A. Goren, M. M. Silva, Lifeng Liu, C. M. Costa, S. Lanceros-Mendez, “Poly(vinylidene fluoride-co-chlorotrifluoroethylene) (PVDF-CTFE) lithium-ion battery separator membranes prepared by phase inversion” *RSC Adv.* **2015**, 5, 90428-90436
17. Y. Chen, Lifeng Liu, J. Xiong,* Y. Qin, C.L. Yan*, “Porous Si nanowires from cheap metallurgical silicon stabilized by surface oxide layer for lithium ion batteries” *Adv. Funct. Mater.* **2015**, 25, 6701.
18. J.L. Lado, X.G. Wang, E. Paz, E. Carbo-Argibay, C. Rodriguez-Abreu, Lifeng Liu, K. Kovnir, Y.V. Kolen’ko, “Design and synthesis of a novel highly active Al-Ni-P foam electrode for hydrogen evolution reaction” *ACS Catalysis* **2015**, 5, 6503.
19. Lifeng Liu,* “Efficient water oxidation using α -Fe₂O₃ thin films conformally coated on vertically aligned titania nanotube arrays by atomic layer deposition” *Mater. Lett.* 159 (2015) 284-288.
20. X.Q. Bao, D. Petrovykh, P. Alpuim, D. Stroppa, N. Guldris, M. Costa, H. Fonseca, J. Gaspar, C.H. Jin, Lifeng Liu*, “Amorphous molybdenum oxysulfide modified p-type silicon microwire arrays for efficient photoelectrochemical water splitting” *Nano Energy* **2015**, 16, 130-142.
21. Enrique Carbo-Argibay, X.Q. Bao, C. Rodriguez, M. Fatima Cerqueira, D. Y. Petrovykh, Lifeng Liu, Y. V. Kolen’ko, “Up-scaling the Synthesis of Cu₂O Submicron Particles with Controlled Morphologies for Solar H₂ Evolution from Water” *J. Colloid. Interf. Sci.* **2015**, 456, 219-227.
22. X.Y. Lu, J.W. Deng, W.P. Si, Lifeng Liu, C.L. Yan, S. Oswald, O.G. Schmidt, “Trilayered Pd/MnOx/Pd Nanomembranes as Cathode Materials for Rechargeable Li-O₂ Batteries with Extremely Low Charge Potential” *Adv. Sci.* **2015**, 1500113
23. X.G. Wang, Y.V. Kolen’ko, X.Q. Bao, K. Kovnir, Lifeng Liu,* “One-step synthesis of self-supported nickel phosphide nanosheet array cathodes for efficient electrocatalytic H₂ generation” *Angew. Chem. Int. Ed.* 54 (2015) 8188.
24. Xiao-Qing Bao, M. Fatima Cerqueira, Pedro Alpuim, Lifeng Liu,* “Silicon Nanowire Arrays Coupled with Cobalt Phosphide Spheres as A Low-Cost Photocathode for Efficient Solar Hydrogen Evolution” *Chem. Commun.* 51 (2015) 10742-10745.
25. X.G. Wang, Y.V. Ko’lenko, Lifeng Liu,* “Direct solvothermal phosphorization of nickel foam to fabricate Ni₂P-nanorods/Ni integrated electrodes for efficient electrocatalytic hydrogen evolution” *Chem. Commun.* 51 (2015) 6738. (Highlighted as back cover)

26. M. Kundu, ***Lifeng Liu****, “Binder-free electrodes consisting of porous NiO nanofibers directly electrospun on nickel foam for high-rate supercapacitors” *Mater. Lett.* 144 (2015) 114.
27. X.Q. Bao, ***Lifeng Liu****, “Platinum nanoparticle promoted performance improvement in silicon/PEDOT:PSS hybrid solar cells” *Mater. Chem. Phys.* 149-150 (2015) 309-316.
28. M. Kundu, ***Lifeng Liu,**** “Electrospun porous nickel oxide nanofibers for high-performance electrochemical energy storage” *Sci. Lett.* 4 (2015) 123.

2014

29. X.H. Liu,* W.P. Si, X.L. Sun, J.W. Deng, S. Baunack, S. Oswald, ***Lifeng Liu,*** C.L. Yan,* O.G. Schmidt, “Free-Standing Fe₂O₃ Nanomembranes as Anodes for Li-Ion Batteries with Long Cycling Life and High-Rate Capability” *Sci. Reports* 4 (2014) 7452.
30. X.L. Sun, W.P. Si, X.H. Liu, J.W. Deng, L.X. Xi, ***Lifeng Liu,*** C.L. Yan, O.G. Schmidt, “Multifunctional nickel/oxide hybrid nanomembranes as anode materials for high-performance Li-ion batteries” *Nano Energy* 9 (2014) 168.
31. X.Q. Bao, ***Lifeng Liu****, “Improved photo-stability of silicon nanobelt arrays by atomic layer deposition for efficient photocatalytic hydrogen evolution” *J. Power Sources* 268 (2014) 677.
32. ***Lifeng Liu,**** X.Q. Bao, “Silicon nanowires fabricated by porous gold thin film assisted chemical etching and their photoelectrochemical properties” *Mater. Lett.* 125 (2014) 28-31.
33. L. Zhang*, J.W. Deng, ***Lifeng Liu,*** W.P. Si, S. Oswald, L.X. Xi, M. Kundu, G.Z. Ma, T. Gemming, S. Baunack, F. Ding, C. L. Yan, O. G. Schmidt, “Hierarchically designed SiO_x/SiO_y bilayer nanomembranes as stable anodes for lithium ion batteries” *Adv. Mater.* 26 (2014) 4527.
34. X.L. Sun, C.L. Yan,* Y. Chen, W.P. Si, J.W. Deng, S. Oswald, ***Lifeng Liu,*** O.G. Schmidt, “Three-dimensionally curved NiO nanomembranes as ultra high rate capability anodes for Li-ion batteries with long cycle life” *Adv. Energy Mater.* 4 (2014) 1300912
35. X.Q. Bao, R. Ferreira, E. Paz, D.C. Leitao, A. Silva, S. Cardoso, P.P. Freitas, ***Lifeng Liu****, “Ordered array of tilted silicon nanobelts with enhanced solar hydrogen evolution performance” *Nanoscale* 6 (2014) 2097-2101.
36. ***Lifeng Liu,**** Xingsen Gao “Fabrication of Bi₂Fe₄O₉ nanotubes decorated with iron-rich nanorings by Rayleigh instability induced sol-gel synthesis in porous anodic alumina” *J. Nanosci. Lett.* 4 (2014) 6

2013

37. ***Lifeng Liu****, “Nano-aggregates of cobalt nickel oxysulfide as a high-performance electrode material for supercapacitors” *Nanscale* 5

- (2013) 11615.
38. Manab Kundu, Cheuk Chi Albert Ng, Dmitri Y. Petrovykh, Lifeng Liu* “Nickel foam supported mesoporous MnO₂ nanosheets with superior lithium storage performance” *Chem. Commun.* 49 (2013) 8459.
39. Manab Kundu, Lifeng Liu,* “Direct growth of mesoporous MnO₂ nanosheet arrays on nickel foam current collectors for high-performance pseudocapacitors” *J. Power Sources* 243 (2013) 676.
40. Lifeng Liu* “Porous Co₁₆S₁₆O₉₆ nanosheets as a new electrode material for use in supercapacitors” *J. Power Sources*, 239 (2013) 24.
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Oral Communications Delivered at International Conferences, Workshops, and Universities/Research Organizations (as a presenter):

- 1 “Atomic layer deposition of metal oxides and sulfides for electrochemical and

- photoelectrochemical water splitting” (**INVITED**)
Lifeng Liu,* Dehua Xiong
Workshop on Hybrid Materials by ALD/MLD & Iberian ALD, Jan. 23-25 (COST funded workshop)
NanoGUNE, San Sebastian, Spain
- 2 “Water splitting for renewable energy storage” (**INVITED**)
The 21st Meeting of the Portuguese Electrochemical Society & 18th Iberian Meeting of Electrochemistry
September 14 – 17, 2016, Institute of Polytech, Braganca, Portugal
- 3 “Bifunctional Ni-P Nanocatalysts Supported on Carbon Paper for Highly Efficient and Stable Overall Water Splitting”
The 9th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications, June 13 – 17, 2016, Strasbourg, France
- 4 “Self-Supported Three-Dimensional Macroporous Nickel Phosphide Electrodes for Overall Electrochemical Water Splitting”
Symposium I03, The 229th ECS Meeting, May 29 – June 2, 2016, San Diego, USA
- 5 “Self-supported porous nickel phosphide foam as low-cost, earth-abundant bifunctional catalysts for hydrogen and oxygen evolution”
Symposium E, E-MRS Spring Meeting, May 3, 2016, Lille, France
- 6 “Electrochemical and photoelectrochemical hydrogen production based on nanostructures consisting of earth-abundant elements” (**Keynote**)
The XX Meeting of the Portuguese Electrochemical Society, Braga, Portugal
Oct. 21 – 23, 2015
- 7 “Nanostructures consisting of earth-abundant elements for electro- and photoelectron-catalysis” (**INVITED**)
4th International Symposium on Surface Imaging/Spectroscopy at the Solid/Liquid Interface
Krakow, Poland, September 2-4, 2015
- 8 “Ni₂P-nanorods/Ni foam integrated electrode for efficient electrocatalytic H₂ evolution”
E-MRS Spring Meeting 2015, Lille, France, May 11-15, 2015
- 9 “Extraordinarily efficient electrocatalytic hydrogen evolution achieved by amorphous MoO_xS_y catalysts electrodeposited on crystalline TiO₂ nanotubes arrays”
NanoPT2015 International Conference, Feb 11-13, 2015, Porto, Portugal
- 10 “Semiconductor Nanostructure Arrays for Photoelectrochemical Water Splitting”
The 19th Annual Meeting of the Portuguese Electrochemical Society, June 30 – July 2, 2014, Aveiro, Portugal
- 11 “Nanostructured materials for solar fuel production and electrochemical energy storage” (**INVITED**)
Institute of Chemistry, University of Sao Paulo, Brazil, June 4, 2014
- 12 “Porous Nanostructures for Electrocatalysis and Electrochemical Energy Storage” (**INVITED**)
Department of Chemistry, Federal University of Ceara, Brazil, June 2, 2014
- 13 “Metal Oxide Nanostructures for Electrochemical Energy Storage” (**INVITED**)
Thematic workshop “Energy: Storage, Conversion, Materials and Catalysis”

- The 37th Annual Meeting of Brazilian Chemical Society, Natal, Brazil, May 28, 2014
- 14 “Solar fuel production based on rationally designed nanostructures” **(INVITED Plenary Lecture)**
The 37th Annual Meeting of Brazilian Chemical Society, Natal, Brazil, May 28, 2014
- 15 “Silicon based materials for hybrid solar cells and photoelectrochemical cells” **(KEYNOTE speech)**
NanoPT2014 International Conference, Porto, Portugal, February 12, 2014
- 16 “Nanostructured metal oxide electrodes for electrochemical energy storage” **(INVITED)**
14th International Conference Advanced Batteries, Accumulators and Fuel Cells
Brno University of technology, Brno, Czech Republic, September 2, 2013
- 17 “Nanostructures for solar hydrogen production and electrochemical energy storage” **(INVITED)**
Institute of Integrative Nanoscience, IFW-Dresden, Germany, May 24, 2013
- 18 “Nickel foam supported MnO₂ nanosheets for electrochemical energy storage”
ImagineNano 2013, Bilbao, Spain, Apr. 24, 2013
- 19 “Nickel foam supported MnO₂ nanosheets for electrochemical energy storage”
The 18th meeting of the Portuguese Electrochemical Society, Porto, Portugal, Mar.27 2013
- 20 “Nanostructures for energy conversion and storage”
Workshop Nano12, Lisbon, Portugal, Oct. 18, 2012
- 21 “Bottom-up fabrication of vertically aligned arrays of nanowires and nanotubes”
TRAIN2 workshop, Braga, Portugal, Jun. 8, 2012
- 22 “Continuous Fabrication of free-standing TiO₂ nanotube array membranes with controllable through-hole morphology”
EMRS Fall Meeting, Warsaw, Poland, Sept 22, 2011
- 23 “Spontaneous phase & morphology transformations of anodized amorphous TiO₂ nanotubes driven by water at room temperature”
The 4th International Workshop on Smart Materials & Structures, Agadir, Morocco, Sept 18, 2011
- 24 “Porous Pt-based alloy nanostructures: fabrication, characterization and electrocatalytic properties”
The 5th Meeting on Materials Processing and Applications, Alvor, Portugal, Jun.12, 2011
- 25 “Nanoporous anodic aluminum oxide: preparation and application in the fabrication of nanostructures” **(INVITED)**
Max Planck Institute of Colloids and Interfaces, Potsdam, Germany, April 2010
- 26 “Fabrication of complex nanostructures based on ordered porous alumina” **(INVITED)**
MRS Fall Meeting, Boston, USA, Dec. 2009

Internal Oral Communications

- 27 “Electrochemical Energy Storage and Conversion Based on Nanostructured Materials”
1st China-INL workshop on Nanofabrication/Nano-manufacturing, May 4-5, 2015,

- Braga, Portugal
- 28 “Nanomaterials for energy conversion and storage”
The 1st INL-Argentina Workshop on Nanotechnology, 25-26 Sept. 2014, Braga, Portugal
 - 29 “Nanostructured materials for energy storage and conversion”
INL-University of Aveiro workshop, April 23, 2014, Braga, Portugal
 - 30 “Nanostructures for renewable energy storage and conversion”
INL-Brazil workshop, INL, Braga, Portugal, Apr. 16, 2013, Braga, Portugal
 - 31 “Introduction to the group NESCS@INL: facilities and research activities”
The 2nd INL-MIT workshop, Boston, USA, Jun. 15, 2012
 - 32 “Nanostructure arrays: fabrication, characterization and applications”
INL internal seminar, Braga, Portugal, May 17, 2012
 - 33 “Self-organized TiO₂ nanotubes & related composites for energy storage, conversion and sensing”
The 1st INL-MIT workshop, Braga, Portugal, Jul. 18, 2011
 - 34 “Complex functional metallic nanostructures based on porous anodic alumina”
Bi-annual International Evaluation of MPI-Halle, Mar. 2009, Halle, Germany
 - 35 “Tailor-made nanopeapods: structural design of linear noble metal nanoparticle chains”
MPI-Halle Anneal Retreat, May 2008

Posters Delivered at International Conferences as a presenter

1. “Monolithic electrodes comprising transition metal phosphide nanostructures for efficient, durable hydrogen and oxygen evolution reactions”
The 2nd Workshop on Materials Challenges for Fuel Cell & Hydrogen Technologies
Sept. 19 – 21, 2016, Grenoble, France
2. “Monolithic nickel phosphide electrodes for electrochemical water splitting” (**Best Poster Prize**)
The International Summer School on CO₂ conversion: from Fundamentals to Applications
Aug. 29 – Sept. 2, 2016, Villars, Switzerland
3. “Amorphous Oxygen-Rich Molybdenum Oxysulfide Decorated p-Type Silicon Microwire Arrays for Photoelectrochemical Water Reduction”
The 9th European Meeting on Solar Chemistry and Photocatalysis: Environmental Applications, June 13 – 17, 2016, Strasbourg, France
4. “Bifunctional Ni-P Nanocatalysts Supported on Carbon Paper for Highly Efficient and Stable Overall Water Splitting”
Lifeng Liu,* Xiaoguang Wang, Wei Li, Dehua Xiong
Symposium GG, E-MRS Spring Meeting, May 5, 2016, Lille, France
5. “Amorphous Molybdenum Oxysulfide Decorated p-Type Silicon Microwire Arrays for Efficient Photoelectrochemical Water Reduction”
Lifeng Liu*
E-MRS Spring Meeting, Lille, France, May 11-15, 2015
6. “Well-ordered arrays of silicon nanobelts with improved hydrogen evolution performance”
Lifeng Liu*

The 65th Annual Meeting of International Electrochemical Society, Lausanne, Switzerland, Aug 31 – Sept 5, 2014

Selected Oral Communications Delivered at international conferences (non-presenter):

1. “Cobalt nickel phosphide nanowires on the nickel foam as an highly efficient and ultrastable bifunctional catalyst for overall water splitting”

W. Li, X. G. Wang, D. H. Xiong, **Lifeng Liu***

NanoPT 2016 International Conference, Feb. 16 -19, 2016, Braga, Portugal

2. “Facile construction of 3D integrated nickel phosphide composite as wide pH-tolerant electrode for hydrogen evolution reaction”

X. G. Wang, W. Li, D. H. Xiong, **Lifeng Liu***

NanoPT 2016 International Conference, Feb. 16 -19, 2016, Braga, Portugal

3. “Hydrothermal synthesis of vertically aligned high-density MoS₂ and MoSe₂ nanoflakes on Mo foils for efficient electrocatalytic hydrogen evolution”

W. Li, **Lifeng Liu***

The 20th Meeting of the Portuguese Electrochemical Society, Oct. 21 – 23, 2015, Braga, Portugal

4. “Nanostructured nickel phosphide composites with excellent catalytic activity for electrochemical water splitting”

X. G. Wang, W. Li, **Lifeng Liu***

The 20th Meeting of the Portuguese Electrochemical Society, Oct. 21 – 23, 2015, Braga, Portugal

5. “Novel Self-supported nickel phosphide networks as efficient electrocatalyst for hydrogen evolution reaction”

X. G. Wang, Y. V. Kolen'ko, X. Q. Bao, K. Kovnir, **Lifeng Liu***

The 6th International Conferences on Advanced Nanomaterials, Jul. 20 – 22, 2015, Aveiro, Portugal

6. “Direct growth of nickel phosphide nanorods on nickel foam for efficient electrocatalytic hydrogen evolution”

X. G. Wang, Y. V. Kolen'ko, **Lifeng Liu***

NanoPT International Conference, Feb. 11 – 13, 2015, Porto, Portugal

Posters Delivered at International Conferences (non-presenter):

1. “Silicon nanowire arrays coupled with transition-metal phosphides as low-cost photocathodes for water splitting”

D. H. Xiong, X. Q. Bao, **Lifeng Liu***

The 20th Meeting of the Portuguese Electrochemical Society, Oct. 21 – 23, 2015, Braga, Portugal