

Curriculum Vitae

Hyo-Jin Ahn

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■ Career

- 2019.02 ~ Current, Senior Researcher, **LSTME Busan**
- 2017.02~2019.01, Postdoc, **Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU)**, Erlangen, Germany
- 2016.07~2017.02, Postdoc, **Regional Centre of Advanced Technologies and Materials (RCPTM)**, Olomouc, Czech
- 2015.10~ 2016.05, Postdoc, **Korea Atomic Energy Research Institute (KAERI)**, Korea

■ Educational Background

- 2010.03 ~ 2015.08, **Master & Doctoral Degree Combined Program in School of Chemical Engineering, UNIST, Korea**
- 2004.03 ~ 2010. 02, **Nano-engineering, In-Je University, B.S, Korea**

■ Dissertation

- Ph. D. Title :

“Periodic semiconductor nano-structures for the enhanced photovoltaic devices”

Advisor: Professor Ji-Hyun, Jang (e-mail: clau@unist.ac.kr)

This work comprises the controlling of nanostructures of metal oxide via an interference lithography technique and their application in the energy/sensor devices such as Dye sensitized solar cell (DSSC), Photoelectrochemical cell (PEC) and Surface-enhanced Raman spectroscopy (SERS).

■ Area of Expertise

▪ Photoelectrochemical cell (PEC) and electrochemistry

- Proficient fabrication of photo-anode for water splitting cell.
- Proficient synthesis of OER and HER materials
- Proficient for electrochemical analysis

▪ Synthesis and Deposition technique.

- Hydrothermal Growth : ZnO, TiO₂ and α -Fe₂O₃ nanowires.
- Sol-gel process : ZnO, TiO₂ and α -Fe₂O₃ thin film and 3D structure.
- Electrodeposition : Ag, Ni and Fe nanoparticles
- Deposition of CdSe and CdS by using SILAR process.
- Lithography: experienced in lithography aligner.

▪ Interference Lithography (IL).

- Proficient in Set-up of laser and optical tools for IL
- Optimization of the photoresist in lithography process
- Fabrications of 2D and 3D polymer structures in several hundred-nanometer scale using IL

▪ Fabrication of photovoltaic and sensor devices

- PEC. Proficient fabrication of photo-anode for water splitting cell.
- DSSC. Proficient fabrication of TiO₂ working, counter electrode and electrolyte.
- SERS. Experienced in fabrication and measurement of SERS substrate

▪ Characterization technique.

- Electrochemical analysis. Proficient in both DSSC and PEC. Electrochemical Impedance Spectroscopy (EIS) and fitting using equivalent circuit.
- Solar cell performance analysis. I-V curve and IPCE.
- XRD, XPS, FT-IR, TGA, Raman, S.E.M and UV-vis spectroscopy

■ Selected Publications

First Author/Corresponding Author

14. Sung, M.; Kim, T.; **Ahn, H.-J.**; Lee J. "N-type Photoanodes for Photoelectrochemical Water Splitting Using a Newly Synthesized Conjugated Polymer as an Additive", **Polymer (Korea)**, 2022; 46(3): 409-417

13. Ahn, H.-J.; Kment, S.; Naldoni, A.; Zboril, R.; Schmuki, P. “Band gap and Morphology Engineering of Hematite Nanoflakes from an Ex Situ Sn Doping for Enhanced Photoelectrochemical Water Splitting”, *ACS Omega*, 2022, 7, (39), 35109-35117

12. Ahn, H.-J.; Kment, S.; Yoo, J.; Nguyen, NT.; Naldoni, A.; Mohajernia, S; Zboril, R.; Schmuki, P. “Magnetite-free Sn-doped hematite nanoflake layers for enhanced photoelectrochemical water splitting”, *ChemelectroChem*, 2022, e202200066

11. Ahn, H.-J.; Yoon, K.-Y.; Kwak, M.-J.; Park, M.-J.; Jang, J.-H. “Boron Doping of Metal-Doped Hematite for Reduced Surface Recombination in Water Splitting”, *ACS Catal.* 2018, 8 (12), 11932-11939 (IF = 12.221)

10. Ahn, H.-J.*; Lee, J.-S.*; Kim, H.-S.; Hwang, I.-T.; Hong, J.-H.; Shin, J.; Jung, C.-H. “Fabrication of Large Pt Nanoparticles-Decorated rGO Counter Electrode for Highly Efficient DSSCs” *J. Ind. Eng. Chem.* 2018, 65, 318-324 (IF = 4.978)

- *These authors contributed equally to this work.

9. Ahn, H.-J.; Goswami, A.; Riboni, F.; Kment, S.; Naldoni, A.; Mohajernia, S; Zboril, R.; Schmuki, P., “Hematite Photoanode with Complex Nanoarchitecture Providing Tunable Gradient Doping and Low Onset Potential for Photoelectrochemical Water Splitting” *ChemSusChem*, 2018, 11(11), 1873-1879 (IF = 7.804)

8. Ahn, H.-J.; Yoon, K.-Y.; Kwak, M.-J.; Jang, J.-H., “Ti-doped SiO_x passivation layer for greatly enhanced performance of hematite based photoelectrochemical systems” *Angew. Chem. Int. Ed.* 2016, 55 (34), 9922–9926. (IF = 12.257)

7. Ahn, H.-J.; Yoon, K.-Y.; Kwak, M.-J.; Lee, J.-S.; Thiyagarajan, P.; Jang, J.-H., “MoS_x supported hematite with enhanced photoelectrochemical performance.”, *J. Mater. Chem. A*, 2015, 3 (43), 21444-21450 (IF = 10.733)

6. Ahn, H.-J.; Kwak, M.-J.; Lee, J.-S.; Yoon, K.-Y.; Jang, J.-H., “Nanoporous hematite structures to overcome short diffusion lengths in water splitting.”, *J. Mater. Chem. A*, 2014, 2 (47), 19999-20003 (IF = 10.733)

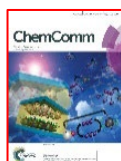
5. Ahn, H.-J.; Kim, M.-J.; Kim, K.; Kwak, M.-J.; Jang, J.-H., “Optimization of Quantum Dot-Sensitized Photoelectrode for Realization of Visible Light Hydrogen Generation.”, *Small*, 2014, 10 (12), 2325-2330 (IF = 10.856)

- Selected as a Back Cover Paper.



4. Ahn, H.-J.; Kim, I.-H.; Yoon, J.-C.; Kim, S.-I.; Jang, J.-H., “p-Doped three-dimensional graphene nano-networks superior to platinum as a counter electrode for dye-sensitized solar cells.”, *Chem. Comm.*, 2014, 50 (19), 2412-2415 (IF = 6.164)

- Selected as a Back Cover Paper.



3. Thiyagarajan, P.*; Ahn, H.-J.* ; Lee, J.-S.; Yoon, J.-C.; Jang, J.-H., “Hierarchical Metal/Semiconductor Nanostructure for Efficient Water Splitting”, *Small*, 2013, 9 (13), 2341-2347 (IF = 10.856)

- Selected as an Inside Cover Paper
- *These authors contributed equally to this work.



2. **Ahn, H.-J.**; Thiyagarajan, P.; Jia, L.; Kim, S.-I.; Yoon, J.-C.; Thomas, E. L.; Jang, J.-H., “An optimal substrate design for SERS: dual-scale diamond-shaped gold nano-structures fabricated via interference lithography.”, *Nanoscale*, 2013, 5 (5), 1836-1842 (IF = 7.233)

1. **Ahn, H.-J.**; Kim, S.-I.; Yoon, J.-C.; Lee, J.-S.; Jang, J.-H., “Power conversion efficiency enhancement based on the bio-inspired hierarchical antireflection layer in dye sensitized solar cells.”, *Nanoscale*, 2012, 4 (15), 4464-4469 (IF = 7.233)

Co-Author :

11. Makimizu, Y; Yoo J.E; Poornajar, M; Nguyen N.T; **Ahn, H.-J.**; Hwang I; Kment S; Schmuki P., “Effects of low oxygen annealing on the photoelectrochemical water splitting properties of α -Fe₂O₃”, *J. Mater. Chem. A*, 2020, 8, 1315-1325 (IF=10.733)

10. Makimizu, Y; Nguyen N.T; Tucek J; **Ahn, H.-J.**; Yoo J.E; Poornajar, M; Hwang I; Kment S; Schmuki P., “Activation of α -Fe₂O₃ for Photoelectrochemical Water Splitting Strongly Enhanced by Low Temperature Annealing in Low Oxygen Containing Ambient”, *Chemistry A European Journal*, 2019, 26(12), 2685-2692 (IF=5.160)

9. Poornajar, M; Nguyen, N.T; **Ahn, H.-J.**; Buchler, M; Liu, N; Kment S; Zboril R; Yoo, J; Schmuki P., “Fe₂O₃ Blocking Layer Produced by Cyclic Voltammetry Leads to Improved Photoelectrochemical Performance of Hematite Nanorods”, *Surfaces*, 2019, 2(1), 131-144 , (IF=pending)

8. Yoon, K.-Y.; **Ahn, H.-J.**; Kwak, M.-J.; Kim, S.-I.; Park, J.; Jang, J.-H., “A selectively decorated Ti-FeOOH co-catalyst for a highly efficient porous hematite-based water splitting system.”, *J. Mater. Chem. A*, 2016, 4 (48), 18730-18736 (IF = 10.733)

7. Ramadoss, A.; Kang, K.; Kim, S.-I.; **Ahn, H.-J.**; Ryu, S.-T.; Jang, J.-H., “Realization of High Performance Flexible Wire Supercapacitors Based on 3-Dimensional NiCo₂O₄/Ni Fibers”, *J. Mater. Chem. A*, 2016, 4 (13), 4718-4727 (IF = 10.733)

6. Yoon, J.-C.; Thiyagarajan, P.; **Ahn, H. -J.**; Jang, J.-H., “A case study: effect of defects in CVD-grown graphene on graphene enhanced Raman spectroscopy”, *RSC Adv.*, 2015, 5 (77), 62772-62777 (IF = 3.049)

5. Ki-Yong Yoon.; **Ahn, H.-J.**; Myung-Jun Kwak.; Thiyagarajan, P.; Jang, J.-h., “Graphene Quantum Dot-Protected Cadmium Selenide Quantum Dot-Sensitized Photoanode for Efficient Photoelectrochemical Cells with Enhanced Stability and Performance”, *Adv. Opt. Mater.*, 2015, 3 (7), 907-912 (IF = 7.43)

4. Hwang, S.-H.; **Ahn, H.-J.**; Yoon, J.-C.; Jang, J.-H.; Park, Y.-B., “Transparent graphene films with a tunable piezoresistive response.”, *J. Matter. Chem. C*, 2013, 1 (43), 7208-7214 (IF = 6.641)

3. Lee, J.-S.; **Ahn, H.-J.**; Yoon, J.-C.; Jang, J.-H., “Three-dimensional nano-foam of few-layer graphene grown by CVD for DSSC.”, *Phys. Chem. Chem. Phys.* 2012, 14 (22), 7938-7943 (IF = 3.567) - Selected as a Cover Paper.



2. Kim, K.; Thiyagarajan, P.; **Ahn, H.-J.**; Kim, S.-I.; Jang, J.-H., “Optimization for visible light photocatalytic water splitting: gold-coated and surface-textured TiO₂ inverse opal nano-networks.”, *Nanoscale*, 2013, 5 (14), 6254-6260 (IF = 7.233)

1. Kim, S.-I.; Lee, J.-S.; **Ahn, H.-J.**; Song, H.-K.; Jang, J.-H., “Facile Route to an Efficient NiO Supercapacitor with a Three-Dimensional Nanonetwork Morphology.”, *ACS Appl. Mater. Interfaces*, 2013, 5 (5), 1596-1603 (IF = 8.097)

■ Teaching Experiences

1. Teaching Assistant for General chemistry I, UNIST, Fall, 2011
2. Teaching Assistant for Experimental of Physical chemistry I, UNIST, Spring, 2013
3. Teaching Assistant for Experimental of Energy materials, UNIST, Fall, 2013

■ Selected Patent Applications

1. “A structural Approach to the Highly Efficient Water Splitting in the Visible Range” Korea Patent No. 10-1376835.
2. “Power Conversion Efficiency Enhancement Based on the Bio-inspired Hierarchical Antireflection Layer in Dye Sensitized Solar Cell” Korea Patent No. 10-1338785.
3. “Air cleaning system based on photocatalyst and gas hydrate” Korea Patent No. 10-2184837

■ Award

1. Superior poster award, Fall, 2014, The Korean chemical society

■ References

1. Prof. Ji-Hyun Jang, School of Energy and chemical engineering, UNIST, Korea,
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