

## Curriculum Vitae

### PERSONAL INFORMATION

**Name** Wooseok Yang, PhD  
**Nationality** Korean (South Korea)  
**E-mail** wooseok.yang@skku.edu  
**ORCID** 0000-0001-8750-5682  
**ResearcherID** S-6111-2016  
**Google Scholar** <https://scholar.google.com/citations?user=Ye3y93MAAAAJ&hl=en>  
**Lab** <https://wooseokyang.wixsite.com/noel>

### EDUCATION

**2012 – 2018** Ph. D. Department of Materials Science and Engineering  
Yonsei University, Republic of Korea  
Supervisor: Prof. Jooho Moon  
**2007 – 2012** B.S. Department of Ceramic Engineering  
Yonsei University, Republic of Korea

### CURRENT AND PREVIOUS POSITIONS

**2022 – Present** **Assistant professor** School of chemical engineering, Sungkyunkwan University (SKKU), Republic of Korea  
**2019 – 2021** **Postdoctoral researcher** Department of Chemistry, University of Zurich, Switzerland  
Supervisor: *Prof. David Tilley*  
**2018 – 2019** **Postdoctoral researcher** Department of Materials Science and Engineering, Yonsei University, Republic of Korea Supervisor: *Prof. Jooho Moon*

### FELLOWSHIPS / AWARDS / GRANTS

**2022** The Young Scientist Awards, Finalist, NANO KOREA 20220 Symposium  
**2021** Swiss Clean Tech Award Runner-Up, Swiss Chemical Society  
**2020** URPP LightChEC Travel Grant  
**2020 – 2021** Postdoctoral Forschungskredit der Universität Zürich Fellow (FK-19-117)  
**2019 – 2020** Fostering the Next-Generation Researchers Program:  
The National Research Foundation of Korea Fellowship (2019R1A6A3A03032834)  
**2018** MRS Best Poster Award Nominee, Materials Research Society  
**2017** MRS-S Graduate Student Awards, Materials Research Society Singapore  
**2016** Graduate Student Competitive Research Awards, Yonsei Graduate School

### REVIEWER FOR PEER-REVIEWED JOURNALS

**2019 – present** *Nature Communications, Nature Synthesis, Journal of Physical Chemistry Letters, Journal of Materials Chemistry A, Chemistry of Materials, ACS Applied Materials & Interfaces, ACS Applied Energy Materials & Interfaces, Thin Solid Films, 한국인쇄전자협회학술지,*

## PUBLIC OUTREACH

- 2016 Writing articles for the webzine – *Hankyoreh ScienceOn* (the life of graduate students in Science and Engineering)

## PUBLICATIONS

- Total citations: 3067, h-index: 30, i10-index: 43 (by Google Scholar, 4<sup>th</sup> January 2023)
  - 00: first-author, 00: second-author, 00: corresponding-author
48. Peixun Xiong, Jeiwan Tan, Hongdae Lee, Neul Ha, Sang Joon Lee, **Wooseok Yang\***, and Ho Seok Park\* "Two-dimensional carbon-based heterostructures as bifunctional electrocatalysts for water splitting and metal-air batteries", *Nano Materials Science*, **2023**
47. Wenzhe Niu, Thomas Moehl, Pardis Adams, Xi Zhang, Robin Lefèvre, Aluizio M. Cruz, Peng Zeng, Karsten Kunze, **Wooseok Yang**, and S. David Tilley\* "Crystal orientation-dependent etching and trapping in thermally oxidised Cu<sub>2</sub>O photocathodes for water splitting", *Energy Environ. Sci.*, **2022**, 15, 2002-2010
46. Juwon Yun, Jeiwan Tan, Young-Kwang Jung, **Wooseok Yang**, Hyungsoo Lee, Sunihl Ma, Young Sun Park, Chan Uk Lee, Wenzhe Niu, Jeongyoub Lee, Kyungmin Kim, S. David. Tilley, Aron Walsh,\* and Jooho Moon\* "Interfacial Dipole Layer Enables High-Performance Heterojunctions for Photoelectrochemical Water Splitting", *ACS Energy Lett.*, **2022**, 7, 1392-1402
45. Jaemin Park, Hyunseok Yoon, Dong-Yeop Lee, Su Geun Ji, **Wooseok Yang**, S. David Tilley, Myeong-Chang Sung, Ik Jae Park, Jeiwan Tan, Hyungsoo Lee, Jin Young Kim, Dong-Wan Kim, Jooho Moon\* "Photovoltaic powered solar hydrogen production coupled with waste SO<sub>2</sub> valorization enabled by MoP electrocatalysts", *Applied Catalysis B: Environmental*, **2022**, 305, 121045
- 44 Xi Zhang, **Wooseok Yang\***, Wenzhe Niu, Pardis Adams, Zhenbin Wang, S. David Tilley\* "Thiol-amine-based Solution Processing of Cu<sub>2</sub>S Thin Films for Photoelectrochemical Water Splitting", *ChemSusChem*, **2021**, 14 (18), 3967-3974
43. Hang Chen, Jingguo Li, **Wooseok Yang**, Christos K. Mavrokefalos, Greta R. Patzke\* "The role of surface states on reduced TiO<sub>2</sub>@BiVO<sub>4</sub> photoanodes: Enhanced water oxidation performance through improved charge transfer processes", *ACS Catalysis*, **2021**, 11, 13, 7637-7646
42. **Wooseok Yang**, Xi Zhang, S. David Tilley\* "Emerging Binary Chalcogenide Light Absorbers: Materials Specific Promises and Challenges", *Chem. Mater.*, **2021**, 33, 3467-3489
41. Jeiwan Tan, **Wooseok Yang**, Hyungsoo Lee, Jaemin Park, Kyungmin Kim, Oliver S. Hutter, Laurie J. Phillips, Sanggi Shim, Juwon Yun, Youngsun Park, Jeongyoub Lee, Jonathan D. Major, and Jooho Moon\* "Surface restoring of polycrystalline Sb<sub>2</sub>Se<sub>3</sub> thin films by conjugated molecules enabling high onset potential photocathodes for photoelectrochemical water splitting", *Applied Catalysis B – Environmental*, **2021**, 286, 119890
40. **Wooseok Yang**, Thomas Moehl, Erin Service, S. David Tilley\* "Operando Analysis of Semiconductor Junctions in Multi-Layered Photocathodes for Solar Water Splitting by Impedance Spectroscopy", *Advanced Energy Materials*, **2021**, 11 (9), 2003569
39. **Wooseok Yang**<sup>‡</sup>, Jaemin Park<sup>‡</sup>, Hyeok-Chan Kwon<sup>‡</sup>, Oliver S. Hutter, Laurie J. Phillips, Jeiwan Tan, Hyungsoo Lee, S. David Tilley, Jonathan D. Major and Jooho Moon\* "Solar water splitting exceeding 10 % efficiency via low-cost Sb<sub>2</sub>Se<sub>3</sub> photocathodes coupled with semitransparent perovskite photovoltaics", *Energy & Environ. Sci.* **2020**, 13, 4362-4370
38. Hyungsoo Lee, **Wooseok Yang**, Jeiwan Tan, Jaemin Park, Sanggi Shim, Youngsun Park, Juwon Yun, Kyungmin Kim and Jooho Moon\* "High-performance phase-pure SnS photocathodes for photoelectrochemical water splitting obtained via molecular ink-derived seed-assisted growth of nanoplates", *ACS Appl. Mater. Interfaces*, **2020**, 12, 15155-15166

37. Jihoon Ahn, Sunihl Ma, Ji-Young Kim, Jihoon Kyhm, **Wooseok Yang**, Jung Ah Lim, Nicholas A. Kotov\*, and Jooho Moon\* “Chiral 2D Organic Inorganic Hybrid Perovskite with Circular Dichroism Tunable Over Wide Wavelength Range”, *Journal of American Chemical Society*, **2020**, *142*, 4206-4212
- 36. Wooseok Yang**‡, Jin Hyun Kim‡, Oliver S. Hutter, Laurie J. Phillips, Jaiwan Tan, Jaemin Park, Hyungsoo Lee, Jonathan D. Major\*, Jae Sung Lee\*, and Jooho Moon\* “Benchmark performance of low-cost Sb<sub>2</sub>Se<sub>3</sub> photocathodes for unassisted solar overall water splitting”, *Nature Communications*, **2020**, *11*, 861
35. Ramireddy Boppella, Jaemin Park **Wooseok Yang**, Jaiwan Tan and Jooho Moon “Efficient Electrocatalytic Proton Reduction on CoP Nanocrystals Embedded in Microporous P, N Co-Doped Carbon Spheres with Dual Active Sites”, *Carbon*, **2020**, *156*, 529
- 34.** Jaemin Park, **Wooseok Yang**, Jaiwan Tan, Hyungsoo Lee, Ju Won Yun, Sang Gi Shim, Young Sun Park, and Jooho Moon\* “Hierarchal Nanorod-Derived Bilayer Strategy to Enhance Photocurrent Density of Sb<sub>2</sub>Se<sub>3</sub> Photocathodes for Photoelectrochemical Water Splitting”, *ACS Energy Lett.*, **2020**, *5*, 136
- 33.** **Wooseok Yang**, Rajiv Ramanujam Prabhakar, Jaiwan Tan, S. David Tilley, Jooho Moon “Strategies for Enhancing Photocurrent, Photovoltage, and Stability of Photoelectrodes for Photoelectrochemical Water Splitting”, *Chem. Soc. Rev.*, **2019**, *48*, 4979
- 32.** **Wooseok Yang** and Jooho Moon “Rapid Advances in Antimony Triselenide Photocathodes for Solar Hydrogen Generation” *Journal of Material Chemistry A*, **2019**, *7*, 20467-20477
- 31.** Hyungsoo Lee†, **Wooseok Yang**‡, Jaiwan Tan, Yunjung Oh, Jaemin Park, and Jooho Moon, “Cu-doped NiO as an Effective Hole Selective Layer for High Performance Sb<sub>2</sub>Se<sub>3</sub> Photocathode for Photoelectrochemical Water Splitting”, *ACS Energy Letters*, **2019**, *4*(5), 995 (**co-first author**†)
- 30.** Jaiwan Tan, **Wooseok Yang**, Yunjung Oh, Hyungsoo Lee, Jaemin Park, Ramireddy Boppella, Joosun Kim and Jooho Moon, “Fullerene as a photo-electron transfer promoter enabling stable TiO<sub>2</sub>-protected Sb<sub>2</sub>Se<sub>3</sub> photocathodes for photoelectrochemical water splitting”, *Advanced Energy Materials*, **2019**, *9*(16), 1900179 (**Inside Front Cover**)
- 29.** Jaemin Park, **Wooseok Yang**, Yunjung Oh, Jaiwan Tan, Hyungsoo Lee, Ramireddy Boppella, Jooho Moon, “Efficient Solar to Hydrogen Conversion from Neutral Electrolytes using Morphology-Controlled Sb<sub>2</sub>Se<sub>3</sub> Light Absorbers”, *ACS Energy Letters*, **2019**, *4*, 517
- 28.** Yunjung Oh, **Wooseok Yang**, Jaiwan Tan, Hyungsoo Lee, Jaemin Park, Jooho Moon, “Boosting Visible-Light Harvesting in p-type Ternary Oxides for Solar-to-Hydrogen Conversion using Inverse Opal Structure” *Advanced Function Materials*, **2019**, *29*(17), 1900194
27. Rami Reddy Boppella, Jaiwan Tan, **Wooseok Yang**, Jooho Moon, “Homologous CoP/NiCoP Heterostructure on N-Doped Carbon toward Highly Efficient and pH-Universal Hydrogen Evolution Electrocatalysis”, *Advanced Functional Materials*, **2018**, *29*, 1807976
- 26.** **Wooseok Yang**, Jooho Moon, “Recent Advances in Earth-Abundant Photocathodes for Photoelectrochemical Water Splitting”, *ChemSusChem*, **2019**, *12*(9), 1889, **Invited review**
- 25.** Rami Reddy Boppella, **Wooseok Yang**, Jaiwan Tan, Hyeok-Chan Kwon, Jaemin Park, Jooho Moon, “Black Phosphorus Supported Ni<sub>2</sub>P Co-catalyst on Graphitic Carbon Nitride Enabling Simultaneous Boosting Charge Separation and Surface Reaction”, *Applied Catalysis B: Environmental*, **2019**, *242*, 422
- 24.** **Wooseok Yang**, Hyeok-Chan Kwon, Jaiwan Tan, Hyungsoo Lee, Jaemin Park, Yunjung Oh, Seungmin Lee, Hyunyong Choi, Jooho Moon, “Time-Resolved Observation of Photo-Generated Charge Carrier Dynamics in Sb<sub>2</sub>Se<sub>3</sub> Photocathodes for Photoelectrochemical Water Splitting”, *ACS Nano*, **2018**, *12*, 11088.
- 23.** **Wooseok Yang**, Jihoon Ahn, Yunjung Oh, Jaiwan Tan, Hyungsoo Lee, Jaemin Park, Hyeok-Chan Kwon, Juran Kim, William Jo, Joosun Kim, Jooho Moon, “Adjusting the anisotropy of 1D Sb<sub>2</sub>Se<sub>3</sub> nanostructures for highly efficient photoelectrochemical water splitting”, *Advanced Energy Materials*, **2018**, *8*, 1702888 (**Front Cover**)

22. Jeiwan Tan, **Wooseok Yang**, Yunjung Oh, Hyungsoo Lee, Jaemin Park, Jooho Moon, "Controlled Electrodeposition of Photoelectrochemically Active Amorphous MoS<sub>x</sub> co-catalyst on Sb<sub>2</sub>Se<sub>3</sub> Photocathode", *ACS Applied Materials & Interfaces*, **2018**, *10* (13), 10898
21. Hyeok-Chan Kwon, **Wooseok Yang**, Daehee Lee, Jihoon Ahn, Eunsong Lee, Sun Ihl Ma, Kyungmi Kim, Seongcheol Yun, Jooho Moon, "Investigating Recombination and Charge Carrier Dynamics in One-Dimensional Nanopillared Perovskite Absorber", *ACS Nano*, **2018**, *12*, 4233
20. Yunjung Oh, **Wooseok Yang**, Jeiwan Tan, Hyungsoo Lee, Jaemin park, Jooho Moon, "Photoelectrodes based on 2D Opals Assembled from Cu-Delafossite Double-Shelled Microspheres for Enhanced Photoelectrochemical Response", *Nanoscale*, **2018**, *10*, 3720
19. Jimin Kim†, **Wooseok Yang**†, Yunjung Oh, Hyungsoo Lee, Seonhee Lee, Hyunjung Shin, Joosun Kim, Jooho Moon, "Self-Oriented Sb<sub>2</sub>Se<sub>3</sub> Nanoneedle Photocathodes for Water Splitting Obtained by Simple Spin-Coating Method" *Journal of Materials Chemistry A*, **2017**, *5*, 2180 (co-first author†)
18. Shoyebmohamad F. Shaikh, Hyeok-Chan Kwon, **Wooseok Yang**, Rajaram Mane, Jooho Moon, "Performance enhancement of mesoporous TiO<sub>2</sub>-based perovskite solar cells by ZnS ultrathin-interfacial modification layer, *Journal of Alloys and Compounds*, **2018**, *738*, 405
17. Yunjung Oh, **Wooseok Yang**, Jimin Kim, Sunho, Jeong, Jooho, Moon, "Enhanced Photocurrent of Transparent CuFeO<sub>2</sub> Photocathodes by Self-Light-Harvesting Architecture" *ACS Applied Materials & Interfaces*, **2017**, *9*(16), 14078
16. Jimin Kim, **Wooseok Yang**, Yunjung Oh, Joosun Kim, Jooho Moon, "Template-directed fabrication of vertically aligned Cu<sub>2</sub>ZnSnS<sub>4</sub> nanorod arrays for photoelectrochemical applications via a non-toxic solution process" *Journal of Alloys and Compounds*, **2017**, *691*, 457
15. Jihoon Ahn, Eunsong Lee, Jeiwan Tan, **Wooseok Yang**, Bokyung Kim, Jooho Moon "A New Class of Chiral Semiconductors: Chiral-Organic-Molecule-Incorporating Organic-Inorganic Hybrid Perovskites", *Materials Horizons*, **2017**, *4*(5), 851
14. **Wooseok Yang**, Yunjung Oh, Jimin Kim, Myung Jin Jeong, Jong Hyeok Park, Jooho Moon, "Molecular Chemistry Controlled Hybrid-ink Derived Efficient Cu<sub>2</sub>ZnSnS<sub>4</sub> Photocathodes for Photoelectrochemical Water Splitting" *ACS Energy LETTERS*, **2016**, *1*, 1127
13. **Wooseok Yang**, Yunjung Oh, Jimin Kim, Hyunchul Kim, Hyungjung Kim, Jooho Moon, "Photoelectrochemical Properties of Vertically-Aligned CuInS<sub>2</sub> Nanorod Arrays Prepared via Template-Assisted Growth and Transfer" *ACS Applied Materials & Interfaces*, **2016**, *8*(1), 425
12. Hongseuk Lee, Areum Kim, Hyeok-Chan Kwon, **Wooseok Yang**, Yunjung Oh, Daehee Lee, Jooho Moon, "Retarding Crystallization during Facile Single Coating of NaCl-incorporated Precursor Solution for Efficient Large-area Uniform Perovskite Solar Cells" *ACS Applied Materials & Interfaces*, **2016**, *8*(43), 29419
11. Shoyebmohamad F. Shaikh, Hyeok-Chan Kwon, **Wooseok Yang**, Hyewon Hwang, Hongseuk Lee, Eunsong Lee, Sun Ihl Ma, Jooho Moon, "La<sub>2</sub>O<sub>3</sub> Interface Modification of Mesoporous TiO<sub>2</sub> Nanostructures Enabling Highly Efficient Perovskite Solar Cells" *Journal of Materials Chemistry A*, **2016**, *4*(40), 15478
10. Yunjung Oh, **Wooseok Yang**, Jimin Kim, Kyoohye Woo, Jooho Moon, "Aqueous Solution-Phase Selenized CuIn(S,Se)<sub>2</sub> Thin Film Solar Cells Annealed under Inert Atmosphere" *ACS Applied Materials & Interfaces*, **2015**, *7*(40), 22570
9. Yulim Won, Areum Kim, **Wooseok Yang**, Sunho Jeong, Jooho Moon, "A highly stretchable, helical copper nanowire conductor exhibiting a stretchability of 700%" *NPG Asia Materials*, **2014**, *6*, e132; doi:10.1038/am.2014.88
8. Yulim Won, Areum Kim, Donggyu Lee, **Wooseok Yang**, Kyoohye Woo, Sunho Jeong, Jooho Moon, "Annealing-free fabrication of highly oxidation-resistive copper nanowire composite conductors for photovoltaics" *NPG Asia Materials*, **2014**, *6*, e105; doi:10.1038/am.2014.36

## Curriculum Vitae (Wooseok Yang)

Sungkyunkwan University (SKKU)

7. Kyoohee Woo, Youngwoo Kim, **Wooseok Yang**, Kyujin Kim, Inhyuk Kim, Yunjung Oh, Jin Young Kim, Jooho Moon, "Band-gap-graded  $\text{Cu}_2\text{ZnSn}(\text{S}_{1-x}\text{Se}_x)_4$  Solar Cells Fabricated by an Ethanol-based, Particulate Precursor Ink Route" *Scientific Reports*, **2013**, 3, 3069, DOI: 10.1038/srep03069
6. Sunho Jeong, Ji-Yoon Lee, Sun Sook Lee, Yeong-Hui Seo, So-Yun Kim, Jang-Ung Park, Beyong-Hwan Ryu, **Wooseok Yang**, Jooho Moon, Youngmin Choi, "Metal salt-derived In-Ga-Zn-O semiconductors incorporating formamide as a novel co-solvent for producing solution-processed, electrohydrodynamic-jet printed, high performance oxide transistors" *Journal of Materials Chemistry C*, **2013**, 1(27), 4236
5. **Wooseok Yang**, Keunkyu Song, Yangho Jung, Sunho Jeong, Jooho Moon, "Solution-deposited Zr-doped  $\text{AlO}_x$  gate dielectrics enabling high-performance flexible transparent thin film transistors" *Journal of Materials Chemistry C*, **2013**, 1(27), 4275
4. Keunkyu Song, **Wooseok Yang**, Yangho Jung, Sunho Jeong, Jooho Moon, "A solution-processed yttrium oxide gate insulator for high-performance all-solution-processed fully transparent thin film transistors" *Journal of Materials Chemistry*, **2012**, 22(39), p21265
3. Chang Young Koo, Keunkyu Song, Yangho Jung, **Wooseok Yang**, Seung-Hyun Kim, Sunho Jeong, Jooho Moon, "Enhanced Performance of Solution-Processed Amorphous  $\text{LiYInZnO}$  Thin-Film Transistors" *ACS Applied Materials and Interfaces*, **2012**, 4(3), 1456
2. Yangho Jung, **Wooseok Yang**, Chang Young Koo, Keunkyu Song, Jooho Moon, "High performance and high stability low temperature aqueous solution-derived Li-Zr co-doped ZnO thin film transistors" *Journal of Materials Chemistry*, **2012**, 22(12), 5390
1. Yangho Jung, Tae Hoon Yeo, **Wooseok Yang**, Youngwoo Kim, Kyoohee Woo, Jooho Moon, "Direct Photo patternable Organic/Inorganic Hybrid Materials as a Low Dielectric Constant Passivation Layer for Thin Film Transistor Liquid Crystal Displays" *Journal of Physical Chemistry C*, **2011**, 115(50), 25056

### DOMESTIC PAPERS

2. **Wooseok Yang** "태양광-수소 생산을 위한 용액공정 기반 저가  $\text{Sb}_2\text{Se}_3$  광전극 개발 현황" *J. Korean Inst. Electr. Electron. Mater. Eng.*, **2021**, 34 (1), 22
1. **Wooseok Yang**, Jooho Moon, "그린솔라링크 연구단 용액공정 기반 광흡수층 및 투명전극 소재 개발 현황", *Bulletin of the Korean Photovoltaic Society*, **2017**, 3(2), 70

### PATENTS

**Title** Solar Water Splitting Device

**Publication No.** South Korea, 1024183800000

**Publication date** July 48, 2022

**Title** SELF-ORIENTED  $\text{SB}_2\text{SE}_3$  NANO STRUCTURE AND FABRICATION THEREOF

**Publication No.** South Korea, 10-1859863-0000

**Publication date** May 08, 2018

**Title** COATING SOLUTION FOR FORMING TRANSPARENT DIELECTRIC THIN FILM FOR LOW-TEMPERATURE PROCESS AND TRANSPARENT INORGANIC THIN FILM TRANSISTOR HAVING THE THIN FILM FORMED BY THE COATING SOLUTION

**Publication No.** South Korea, 10-1499510

**Publication date** Mar. 02, 2015

**Title** METAL OXIDE THIN FILM, PREPARATION METHOD THEREOF, AND SOLUTION FOR THE SAME

**Publication No.** South Korea, 10-1333316

**Publication date** Nov. 20, 2013

## INVITED SEMINARS

11. **Wooseok Yang**, “Photoelectrochemistry for solar fuel generation: green hydrogen and beyond”, **25<sup>th</sup> May, 2022**, @ 한국화학공학회 재료분위위원회 신진 webinar
10. **Wooseok Yang**, “Emerging semiconductor materials for photoelectrochemical water splitting: from synthesis to advanced device characterizations”, **16<sup>th</sup> May, 2022**, @ SKKU-MSE seminar
9. **Wooseok Yang**, “Solar Hydrogen Production via Photoelectrochemical Water Splitting”, **22<sup>th</sup> April, 2022**, @ KICHe Young Investigator Symposium IV
8. **Wooseok Yang**, “Solar Hydrogen Production via Photoelectrochemical Water Splitting”, **19<sup>th</sup> April, 2022**, @ HUST-SKKU Bilateral Graduate Student Workshop
7. **Wooseok Yang**, “Solar-to-Hydrogen Conversion via Photoelectrochemical Water Splitting”, **29<sup>th</sup> Dec, 2021**, @ INU-MSE
6. **Wooseok Yang**, “Solar-to-Hydrogen Conversion via Photoelectrochemical Water Splitting”, **23<sup>rd</sup> Dec, 2021**, @ Center for Hydrogen and Fuel Cell Research, KIST
5. **Wooseok Yang**, “Solar-to-Hydrogen Conversion via Photoelectrochemical Water Splitting”, **21<sup>st</sup> Dec, 2021**, @ KAIST MSE
4. **Wooseok Yang**, “Operando Analysis of Semiconductor Junctions in Multi-Layered Photocathodes for Solar Water Splitting by Impedance Spectroscopy”, **6<sup>th</sup> Jan, 2021**, @ Yonsei University, Nano Functional Materials Lab (online seminar).
3. **Wooseok Yang**, “Low-Cost Semiconducting Materials for Solar Hydrogen Production”, **7<sup>th</sup> Dec, 2019**, @ ETH Zurich, Hosted by Korean Student Association at ETH Zurich (KSAE).
2. **Wooseok Yang**, “Antimony selenide ( $\text{Sb}_2\text{Se}_3$ ) photocathode for photoelectrochemical water splitting”, **9<sup>th</sup> April, 2018**, @ Lawrence Berkeley National Laboratory (LBNL), Hosted by Korean American Scientists and Engineers Association (KSEA).
1. **Wooseok Yang**, “Antimony selenide ( $\text{Sb}_2\text{Se}_3$ ) photocathode for photoelectrochemical water splitting”, **10<sup>th</sup> April, 2018**, @ Stanford University, Hosted by SUNCAT Center for Interface Science and Catalysis.

## INTERNATIONAL CONFERENCES

17. **Wooseok Yang**, “Low-cost semiconductor materials for photoelectrochemical water splitting”, NANOKOREA 2022 Symposium, **July 2022**
16. **Wooseok Yang**, S. David Tilley, “Characterization of  $\text{Sb}_2\text{Se}_3$ -based multilayer thin film photocathodes for solar water splitting by electrochemical impedance spectroscopy”, E-MRS spring 2021 Online Conference, **June 2021**
15. **Wooseok Yang**, S. David Tilley, “Operando Characterization of Multilayer Thin Film Photocathodes for Photoelectrochemical Water Splitting by Impedance Spectroscopy”, nanoGe 2020 Online Conference, **Oct 2020**
14. **Wooseok Yang**, Jaiwan Tan, Jaemin Park, Hyungsoo Lee, Joosun Kim, and Jooho Moon, “Solution-

Processed Earth-Abundant  $\text{Sb}_2\text{Se}_3$  Nanostructures as Photocathodes for Highly Efficient and Stable Photoelectrochemical Water Splitting”, *Materials Challenges in Alternative and Renewable Energy 2019*, Jeju Island, Republic of Korea, **Aug 2019**

13. **Wooseok Yang**, Jin Hyun Kim, Oliver S. Hutter, Laurie J. Phillips, Jaiwan Tan, Jaemin Park, Hyungsoo Lee, Yunjung Oh, Jonathan D. Major, Jae Sung Lee, and Jooho Moon “Over 1% Efficient Unassisted Solar Water Splitting Based on Earth-Abundant  $\text{Sb}_2\text{Se}_3$  Photocathodes”, 10th International Conference on Materials for Advanced Technologies, Marina bay sands, Singapore, **June 2019**

12. **Wooseok Yang**, Jaiwan Tan, Hyungsoo Lee, Jaemin Park, Yunjung Oh, Hyunyong Choi, Jooho Moon "Solution-Processed, Shape-Controlled  $\text{Sb}_2\text{Se}_3$  Light Absorber for Efficient Photoelectrochemical Water Splitting", 2018 MRS Fall Meeting, Boston, MA, USA, **Nov 2018**

11. **Wooseok Yang**, Hyungsoo Lee, Jaiwan Tan, Jaemin Park, Yunjung Oh, Jooho Moon “Solution-Processed 1D  $\text{Sb}_2\text{Se}_3$  Nanostructure Photocathodes for Highly Efficient Photoelectrochemical Water Splitting”, 2018, International Symposium on Solar Fuels and Solar Cells, Dilian, China, **Oct 2018**

10. **Wooseok Yang**, Jaiwan Tan, Hyungsoo Lee, Jaemin Park, Yunjung Oh, Hyunyong Choi, Jooho Moon "Molecular Ink-Derived  $\text{Sb}_2\text{Se}_3$  Nanostructure Photocathodes for Efficient Photoelectrochemical Water Splitting", 2018 MRS Spring Meeting, Phoenix, Arizona, USA, **April 2018**

9. **Wooseok Yang**, Yunjung Oh, Jaiwan Tan, Hyungsoo Lee, Jaemin Park, Jooho Moon “Investigation of  $\text{Sb}_2\text{Se}_3$  nanostructures as a photocathode for photoelectrochemical water splitting”, 2017 MRS Fall Meeting, Boston, USA, **Nov 2017**

8. **Wooseok Yang**, Joosun Kim, Jooho Moon "Controlled Synthesis of  $\text{Sb}_2\text{Se}_3$  Nanosturctures with Varying Aspect Ratio for Efficient Photoelectrochemical Water Splitting", 9th International Conference on Materials for Advanced Technologies, Suntec City, Singapore, **June 2017**

7. **Wooseok Yang**, Hyungsoo Lee, Yunjung Oh, Jooho Moon "Self-Oriented  $\text{Sb}_2\text{Se}_3$  Nanoneedle Arrays on a Conductive Substrate for Photoelectrochemical Water Splitting Prepared by Simple Spin-Coating Method", 2017 MRS Spring Meeting, Phoenix, Arizona, USA, **April 2017**

6. **Wooseok Yang**, Jimin Kim, Yunjung Oh, Jooho Moon "A Hybrid-Ink Based Approach toward Efficient  $\text{Cu}_2\text{ZnSnS}_4$  Photocathodes for Photoelectrochemical Water Splitting", 2016 MRS Spring Meeting, Phoenix, Arizona, USA, **April 2016**

5. **Wooseok Yang**, Jimin Kim, Yunjung Oh and Jooho Moon " Evaluation of optical and photoelectrochemical properties of template-directed  $\text{Cu}(\text{In,Ga})\text{S}_2$  nanorod arrays" *Materials Challenges in Alternative and Renewable Energy 2016*, Jeju Island, Republic of Korea, **Feb 2015**

4. **Wooseok Yang**, Jimin Kim, Yunjung Oh, Jooho Moon "Aqueous precursor-derived, vertically-aligned  $\text{Cu}(\text{In,Ga})\text{S}_2$  nanorod arrays as a photocathode for photoelectrochemical water splitting" 2014 MRS Fall Meeting, Boston, Massachusetts, USA, **Dec 2014**

3. **Wooseok Yang**, Inhyuk Kim, Kyujin Kim, Yunjung Oh, Jooho Moon "Electronic properties of the solution-processed  $\text{Cu}_2\text{ZnSn}(\text{S}_{1-x}\text{Se}_x)_4$  and  $\text{Cu}_2\text{ZnSn}_x\text{Ge}_{1-x}\text{S}_4$  thin film solar cells" *Global Photovoltaic Conference 2013*, Busan, Republic of Korea, **Nov 2013**

2. **Wooseok Yang**, Seunghee Nam, Seongil Im, Jooho Moon "Determination of Interfacial Trap Density-of-States in Solution-Deposited High-k Dielectric/Semiconductor by Photo-Excited Charge-Collection Spectroscopy" 2013 E-MRS Spring Meeting, Strasbourg, France, **May 2013**

1. **Wooseok Yang**, Keunkyu Song, Yangho Jung, Jooho Moon "Effect of zirconium doping on enhancement of dielectric properties of solution-processed amorphous alumina gate dielectric" *The 12th International Meeting on Information Display*, Daegu, Republic of Korea, **Aug 2012**



**2014)** Jimin Kim, “Fabrication of metal nano-pattern for thin film solar cell”

Jongin Cha, “Template-directed Synthesis of vertically-aligned CIGS nanowire arrays with tunable size”

**2015)** Hyojung Lee, “Effect of surface modification on photoelectrochemical properties of Cu<sub>2</sub>ZnSnS<sub>4</sub>”

Sunihl Ma, “Optimization of EtOH based Cu<sub>2</sub>ZnSnS<sub>4</sub> thin film PEC performance”

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