Yu-Hsuan Liu

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SUMMARY

4 years experiences with enviro-chemical material synthesis and processes. 1.5 years MBA courses for business commercialization. Familiar with envirochemical qualitative/quantitative data analysis and spacial analysis.

EDUCATION

Georgia Institute of Technology — Atlanta, GA
PhD in Civil and Environmental Engineering minor in management/computer science — *Aug 2017 - Present*

Dissertation: Photocatalytic nitrogen fixation for solar ammonia production

Relevant Coursework: Computational Material Science and Engineering, Chemical Principle, Life Cycle Assessment, Intro to GIS, Venture Practicum

National Taiwan University — Taipei, Taiwan
Master in Environmental Engineering — *Sep 2014 - Sep 2016*

Thesis: Manganese/Dioxide Activated Carbon Electrode for Capacitive Deionization

Relevant Coursework: Environmental-catalytic principle and application, Water Quality and Analysis

National Tsing Hua University — Hsinchu, Taiwan
Bachelor in Chemical Engineering — *Sep 2010 - Jun 2014*

SKILLS

- **Material Characterization**: SEM, XPS, XRD, FTIR — **Measurement**:IC, UV-vis, NMR
- **Language and Database**: Matlab, Python, SQL, SimaPro, ArcGIS — **Design**: AutoCAD, Solidwork, Photoshop, Illustrator

EXPERIENCE

The George W. Woodruff School of Mechanical Engineering — Atlanta, GA
Graduate Research Assistant — *Aug 2017 - Present*

- **Design**: Designed and fabricated a confined solar ammonia reactor by Solidworks resulting in 60% reduction in costs
- **Synthesis**: Manufactured mxene doped and metal doped titania for photocatalytic ammonia produciton
- **Characterization**: Characterized the materials and photocatalytic reaction by SEM, XPS, XRD and in-situ FTIR
- **Application**: Solar to ammonia efficiency increased by 3 times for metal doped titania
- **Method**: Developed a new electrochemical ammonium measurement for photocatalytic nitrogen fixation
- **Mechanism**: Experimented a simulation of carbon radical effect with an increase of 3 times ammonia yield via IC and colorimetric measurements
- **Analysis**: Developed a life cycle assessment for various ammonia production methods

GOHBOT, Georgia Tech Research Institute — Atlanta, GA
Consultant — *Aug 2018 - Dec 2018*

- **Business Model**: Got invited by business school professors for commercializing the chicken robot (GOHBOT) project
- **Customer Research**: Established a model survey for poultry industry and connected GOHBOT to 30 new customers and partners
- **Finance**: Developed pricing strategy for GOHBOT and determined short and long term strategy in 5 years

RAPBOX, Georgia Tech Research Institute — Atlanta, GA
Team Lead — *Aug 2017 - May 2018*

- **Marketing and customer research**: Build up the value proposition/MVP and D2C business for the renewable ammonia production cell
- **Operation and Pricing Strategy**: Strategized 5 years timeline from filing patent to launching products and analyze how long we can hit the ROI.

Champion International Environmental Consulting Company — Taipei, Taiwan
Environmental Engineer Intern — *Sep 2016 - Dec 2016*

- **Quality Evaluation**: Conducted environmental site assessment of semiconductor factories wastewater and recycling by SimaPro
- **Honor** : Be awarded as the best evaluation team of the year by Taiwan EPA

Capure Lab — Taipei, Taiwan
Researcher — *Jan 2017 - July 2017*

- **Synthesis**: Fabricated manganese dioxide carbon nanotube composite electrode for electrochemical desalination
- **Characterization**: Characterized and analyzed the electrode by SEM, XPS, XRD and TGA
- **Application**: Desalination performance increased by 60% than pure carbon nanotube electrode

Selected Projects

- **Geographical Information System study**: Influences of Average Height in Adulthood in US by States
  - Compile data from USDA and CDC then converting text data to GIS database.
  - Data Analytic on level of impact factors on height in various states.
- **Life cycle assessment of renewable ammonia production**: A environmental impact and energy analysis for ammonia production process
  - Utilized AspenPlus to conduct mass and energy balance for the chemical process
  - Developed matrix model by Python with saving 50% time
- **Self-sustainable water leaking detection system (SWELDS)**: Use batteries as sensors for water leaking detection system in constructions
  - Helped synthesize zinc / manganese dioxide carbon battery with sodium bicarbonate electrolyte as flexible battery embedded in wall of building.
  - The project was awarded as Best Poster of Career Research Innovation and Development Conference
- **Graphene/water-bourned polyurethane as electromagnetic shielding material**: A flexible conductive shielding material for smartphone
  - Sucessfully synthesized graphene water-borned polyurethane material and characterized in XPS.

Additional Experience & Achievements

- Selected to give talk on Effect of Bias and Aerobic Conditions on Photocatalytic Nitrogen Fixation By Titania at **Electrochemical Society Meeting 2019** in Atlanta, Georgia
- Selected (30 out of 76) to present poster on *The Influence of carbon source for photocatalytic nitrogen fixation by titania* at **The C3E Women in Energy Symposium 2018** in Palo Alto, CA
- Presented poster on *Photocatalytic nitrogen fixation by titania* at **The 17th Southestern Catalysis Society Symposium 2018** in Atlanta, GA
- Earned the *Technological Innovation: Generating Economic Results (TI:GER) Fellowship* with 12000 USD at **Georgia Tech 2017**
- Won *First Prize of Master Thesis Award* (out of 40 students) at **National Taiwan University 2017**
- Won *First Prize of Master/PhD Research Oral Competition* (out of 80 students) at **The Chinese Institute of Environmental Engineering Conference 2016** in Tainan, Taiwan
- Selected to give a talk on *Manganese Dioxide/Activated Carbon Electrode for Enhanced Capacitive Deionization* at **Capacitive Dioinization Electrode Symposium 2016** in The Hague, Netherlands
- Teaching Assistant of Environmental Policy and Management at National Taiwan University in Spring 2015
- Teaching Assistant of Water and Wastewater Treatment at National Taiwan University in Fall 2014

Publication

- Comer, B. M., Fuentes, P. M., Dimpka, C. O., **Liu, Y. H.**, Fernandez, C. A., Arora, P., Realff, M., Singh ,U., Hatzell, M. C., Medford, A. J. (2019).Prospects and Challenges for Solar Fertilizers. Joule.
- **Liu, Y. H.**, Vu, M. H., Lim, J., Do, T. O., Hatzell, M. C. (2019). Influence of Carbonaceous Species on Aqueous Photo-catalytic Nitrogen Fixation by Titania. Faraday Discussion.
- Comer, B. M., **Liu, Y. H.**, Dixit, M. B., Hatzell, K. B., Ye, Y., Crumlin, E. J., ... and Medford, A. J. (2018). The Role of Adventitious Carbon in Photo-catalytic Nitrogen Fixation by Titania. Journal of the American Chemical Society, 140(45), 15157-15160.
- **Liu, Y. H.**, Yu, T. C., Chen, Y. W., and Hou, C. H. (2017). Incorporating Manganese Dioxide in Carbon Nanotube-Chitosan as a Pseudocapacitive Composite Electrode for High-Performance Desalination. ACS Sustainable Chemistry Engineering, 6(3), 3196-3205.
- **Liu, Y. H.**, Hsi, H. C., Li, K. C., and Hou, C. H. (2016). Electrodeposited manganese dioxide/activated carbon composite as a high-performance electrode material for capacitive deionization. ACS Sustainable Chemistry Engineering, 4(9), 4762-4770