



**Exponent**<sup>®</sup>  
Engineering & Scientific Consulting

## Emily Hsu, Ph.D.

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### Professional Profile

Dr. Hsu is a chemical engineer who specializes in failure analysis, separation processes, material characterization, material synthesis, and metallurgy. She has extensive experience in supercritical fluid extraction, electronic waste mediation, and green technology development. Her current research interests span alternative energy processes, process safety, sustainability, and industrial chemical processes.

Prior to joining Exponent, Dr. Hsu was a Graduate Research Assistant at Columbia University, where she conducted research on the recycling of metals from electronic waste and the synthesis of precipitate calcium carbonate from industrial waste via carbon mineralization. In addition, she evaluated the potential for storage of carbon dioxide in geologic formations. Dr. Hsu developed a novel, green treatment scheme utilizing supercritical carbon dioxide for the extraction of Cu from electronic waste. She has experience characterizing materials using scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS/EDX), X-ray diffraction (XRD), inductively coupled plasma-optical emission spectroscopy (ICP-OES), differential scanning calorimetry (DSC), thermogravimetric analysis (TGA), and volumetric adsorption equipment.

Additionally, she held research and development internships with Unilever and Mondelez International. At the former, she investigated the structural integrity of deodorant sticks using texture analyzer and penetrometer techniques. At the latter, she optimized the baking profiles of biscuits via heat transfer studies.

### Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, Columbia University, 2020

M.S., Chemical Engineering, Columbia University, 2017

B.S., Chemical Engineering, Cornell University, 2015

### Prior Experience

Research & Development Intern, Unilever, 2014

Research & Development Intern, Mondelez International, 2013

### Professional Affiliations

American Institute of Chemical Engineers (AIChE) (member)

## Languages

Mandarin Chinese

## Publications

Hsu E, Durning CJ, West AC, Park AHA. Enhanced Extraction of Copper from Electronic Waste via Induced Morphological Changes using Supercritical CO<sub>2</sub>. *Resources, Conservation & Recycling* 2021; 168, 105296.

Hsu E, Barmak K, West AC, Park AHA. Advancements in the Treatment and Processing of Electronic Waste with Sustainability: A Review of Metal Extraction and Recovery Technologies. *Green Chemistry* 2019; 21, 919-936.

Goldberg D, Aston L, Bonneville A, Dermirkanli I, Evans C, Fisher A, Garcia H, Gerrard M, Heesemann M, Hnottavange-Telleen K, Hsu E, Malinverno C, Moran K, Park AHA, Scherwath M, Slagle A, Stute M, Weathers T, Webb R, White M, White S. Geological storage of CO<sub>2</sub> in sub-seafloor basalt: the CarbonSAFE pre-feasibility study offshore Washington State and British Columbia. *Energy Procedia* 2018; 146, 158-165.

### Published Proceedings

Evans CC, Hsu E, Ji M, Liu C, Suntivich J. Optical Waveguides from a Lithographically-Defined Wetting of a High-Index Liquid. *CLEO*, 2015; STu1K.5.

Novak C, Hsu E, Schuster R, Wang X. Measuring Critical Velocity of Water Droplet Removal on Gas Diffusion Layers of Proton Exchange Membrane Fuel Cells. *ASME 11th International Conference on Fuel Cell Science, Engineering and Technology*, 2013

Hsu E, Durning CJ, West AC, Park AHA. Treatment and Extraction of Copper from Electronic Waste Via Induced Morphological Changes Utilizing Supercritical CO<sub>2</sub>. *Virtual AIChE Annual Meeting*, 2020.

Hsu E. Enhanced Extraction of Copper from Electronic Waste Using Supercritical CO<sub>2</sub>. Invited speaker, *Columbia Electrochemical Energy Center*, New York, NY, 2019.

Hsu E, Barmak K, West AC, Park AHA. Treatment and Extraction of Metals from Electronic Waste Using a Novel Solvent Containing Supercritical CO<sub>2</sub>. *AIChE Annual Meeting*, Pittsburgh, PA, 2018.

Hsu E, Hsiao YT, Park AHA, Slagle A, Goldberg D. Tailored Synthesis of High Purity Precipitate Calcium Carbonates (PCC) from Slags. *Gordon Research Conference: Carbon Capture, Utilization and Storage*, New London, NH, 2017.