Jan 28th, 12:00 AM

Using Low-Cost Renewable Energy for Waste Valorization

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With renewable electricity costing 2 cents per kwh to even negative in some places during some periods, how to use cheap renewable energy to maximize waste valorization can become an interesting direction. In this talk, I will discuss some recent progress in identifying the synergy between microbial electrochemistry and photoelectrochemistry that led to the development of new materials and systems for spontaneous high rate H2 production from wastewater and sunlight. I will also report some development on functional hydrophobic gas transfer membrane electrodes that enabled specific resource recoveries from wastewater and CO2. While we have been focusing on energy-neutral wastewater treatment, I argue maybe we can start to think broadly on carbon-negative and dollar-positive wastewater treatment beyond energy production.