DEPARTMENT OF
Chemistry
UNIVERSITY OF WISCONSIN-MADISON

Ph.D. Dissertation Defense

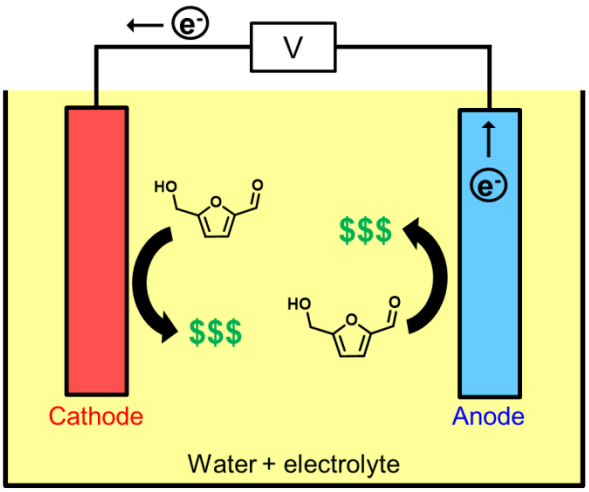
Stephen R. Kubota

Kyoung-Shin Choi Research Group

"Developing catalytic pathways for the valorization of biomass-based platform molecules via electrochemical reduction and oxidation reactions"

Lignocellulosic biomass, the most abundant form of organic carbon on Earth, provides a highly promising alternative material source to fossil fuels due to its renewable and environmentally friendly nature. A considerable amount of research has been devoted to converting lignocellulosic biomass into useful products, and many strategies to synthesize biomass-derived alternatives to fossil fuel-derived products have already been demonstrated.

The presented work describes various electrochemical routes to convert lignocellulosic biomass-derived platform molecules into value-added products via reduction and oxidation reactions in order to replace fossil fuel-derived products. Electrochemical biomass conversion reactions have various advantages over traditional biomass conversion techniques. For example, electrochemical conversions can be performed at ambient temperatures and pressures, the need for stoichiometric amounts of chemical oxidants and reductants are eliminated, water can be used as the oxygen or hydrogen source for oxidation and reduction reactions, and electrochemical reactions are always composed of a simultaneous reduction and oxidation reaction. This means that two valuable products can simultaneously be produced (e.g. simultaneous biomass oxidation and reduction reactions or biomass oxidation and H2 evolution). Additionally, electrochemical biomass conversion can open new catalytic pathways not available by traditional techniques. The strategies reported herein highlight the promising future of electrochemical biomass conversion.



August 24, 2018 at 1:00 pm in room 8335