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Inorganic nanocatalysts for efficient power storage into liquid

Establishment of an efficient method for distribution of electric power is a key to realize a sustainable society which is driven with renewable-energy-based electricity. We demonstrate highly efficient power storage using an alcohol/carboxylic acid redox couple. Glycolic acid (GC), a monovalent alcoholic compound and oxalic acid (OX), a divalent carboxylic acid, are focused as a redox couple due to their stability and transportability as energy-storage media. We achieved high Faradaic efficiencies for the production of GC from OX on ubiquitous TiO_2 catalysts under mild conditions. The most desirable characteristic of this electro-reduction is the suppression of hydrogen evolution even in acidic aqueous media. TEM-EELs mapping for TiO_2 catalysts revealed that whole grain of an active catalyst is composed only of an anatase phase whereas a rutile phase forms on the surface of an inactive one, which suggests that detailed structural control is significantly predominant in this process. Recently, we succeeded in the production of GC via the electrochemical reduction of OX with the help of renewable light energy and continuous GC production using a polymer electrolyte alcohol electrosynthesis cell (PEAEC) for the first time.

Speaker Biography

Miho Yamauchi received her PhD in 2001 from Tsukuba University, Japan. She is currently a professor and principal investigator of catalytic materials transformation division in WPI International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, Japan.

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