Catalysis Center for Energy Innovation

GUEST SEMINAR SPEAKER

Wednesday, October 26, 2016

11:00 AM ▪ 322 ISE

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Biography: Keiichi Tomishige received his B.S., M.S. and Ph.D. from Graduate School of Science, Department of Chemistry, The University of Tokyo with Prof. Y. Iwasawa. During his Ph.D. course in 1994, he moved to Graduate School of Engineering, The University of Tokyo as a research associate and worked with Prof. K. Fujimoto. In 1998, he became a lecturer, and then he moved to Institute of Materials Science, University of Tsukuba as a lecturer in 2001. Since 2004 he has been an associate professor, Graduate School of Pure and Applied Sciences, University of Tsukuba. Since 2010, he is a professor, School of Engineering, Tohoku University. His research interests are the development of heterogeneous catalysts for production of biomass-derived chemicals, direct synthesis of organic carbonates from CO2 and alcohols, steam reforming of biomass tar and syngas production by natural gas reforming.

"Catalytic production of biomass-derived chemicals: development of heterogeneous catalysts for the hydrgeonolysis and hydrodeoxygenation"

Abstract: Our group has been developing Ir-ReOx, Rh-ReOx, and Rh-MoOx catalysts for selective C-O hydrogenolysis of polyols and cyclic ethers such as glycerol, erythritol, tetrahydrofurfruryl alcohol, etc. The catalysts have the structure of Ir or Rh metal surface modified with Re or Mo oxide species. In addition, we proposed the reaction mechanism: the C-O bond hydrogenolysis proceeds by the SN2-like attack of hydride species at the interface between metal and metal oxide species to the adsorbed Re alkoxide species, where hydride species can be formed by the heterolytic dissociation of H2 to hydride+proton (H2→H- + H+). The combination of Ir-ReOx with or without HZSM-5 was found to be effective to the deep C-O hydrogenolysis for the conversion of cellulose and xylan to corresponding alkanes or monoalcohols, respectively. Recently, we also developed heterogeneous ReOx-Pd/CeO2 catalyst for the deoxydehydration for the simultaneous removal of vicinal OH groups for the conversion of glycerol and xylitol to monoalcohols, and erythritol and sorbitol to diols.

The Catalysis Center for Energy Innovation is an Energy Frontier Research Center
funded by the U.S. Department of Energy, Office of Science.