Catalysis Center for Energy Innovation

GUEST SEMINAR SPEAKER

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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.

"Synthesis of carbonates, carbamates and ureas from CO2 and substrates with hydroxide or amine groups using CeO2 catalyst and 2-cyanopyridine"

Abstract: Conversion of carbon dioxide into useful compounds can contribute to the construction of future sustainable society. It is characteristic that our approaches to the CO2 conversion are the synthesis of useful chemicals by non-reductive reaction. Examples of the target compounds are organic carbonates, carbamates, ureas, and so on, which are synthesized from CO2 and corresponding alcohols/amines. It is found that CeO2 is an effective heterogeneous catalyst for these reactions. In the case of carbonates formation from alcohols and CO2, the conversion and yield of products is seriously limited by the reaction equilibrium. The combination of these reactions with the hydration of 2-cyanopyridine enabled very high conversion and yield. In addition, 2-cyanopyridine also plays a crucial role on the activation of alcohols by the interaction of 2-cyanopyridine and CeO2 surface. Recently, this CeO2+2-cyanopyridine was found to be effective to the direct synthesis of polycarbonate from CO2 and diols.

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