SmartMat系列讲座

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报告时间：2024.04.18 下午 **16**:00-17:00

报告地点：天津大学第三教学楼二楼会议室（卫津路校区）

报告题目：**Structure Control of Metal Clusters and Their Application in Energy and Environmental Catalysts**

报告人简介

Yuichi Negishi is a Professor in the Departments of Applied Chemistry at Tokyo University of Science, Japan, where he has served as head of department and dean of graduate school since 2018. He received a PhD degree in Chemistry in 2001 under the supervision of Prof. Atsushi Nakajima from Keio University. Before joining Tokyo University of Science in 2008, he was employed as an Assistant Professor at Keio University and at the Institute for Molecular Science. His research interests include the precise synthesis of stable and functionalized metal nanoclusters and their applications in energy and environmental materials. He has published over 230 scientific papers, which have drawn ~18000 citations (h-index 66). He has won a couple of prestigious awards including PCCP Prize for Outstanding Achievement of Young Chemists, The Chemical Society of Japan Award for Young Chemists, and International Investigator Awards of the Japan Society for Molecular Science.

报告内容简介

In order to build a sustainable society, it is indispensable to create new innovative materials that can solve the problems of the current society. Strict control of the structure of materials at the nanoscale is expected to lead to the creation of such materials. Ultrafine metal clusters, in which several to several dozen metal atoms are aggregated, have novel electronic/geometric structures and physicochemical properties/functions that are different from those of bulk metals composed of the same elements. In addition, doping (alloying) of different elements to these metal clusters results in a variety of structures, properties, and functions. Thus, metal clusters have high potential as constituent units for innovative materials. However, in order to understand the functions of metal clusters and to apply them as materials, it is essential to establish techniques to strictly control the chemical composition and geometric structure of metal clusters. We have established several techniques to strictly control the chemical composition and geometric structure of metal clusters. We also succeeded in establishing a method to control the supported metal clusters to enhance the functionality of advanced water splitting photocatalysts, fuel cell electrocatalysts, and automotive exhaust gas purifying catalysts. Accordingly, we have achieved the highest water-splitting activity for UV-responsive $BaLa_4Ti_4O_{15}$ water-splitting photocatalysts, created platinum electrocatalysts with higher catalytic activity for oxygen reduction than those currently used in fuel cells, and succeeded in developing highly functional catalysts for automotive exhaust gas purification. These our research is unique in that it consistently achieves the atomic-level control of the metal clusters throughout the entire research, from synthesis to control on the support.

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