内蒙古大学 能源材料化学研究院
COLLEGE OF ENERGY MATERIALS AND CHEMISTRY

Structure Control of Metal Clusters and Their Application in Energy and Environmental Catalysts

Yuichi NEGISHI(教授)

时间：9月26日（星期四）上午9点30分

地点：能源材料化学研究院三楼报告厅

邀请人：沈慧研究员

个人简介：

Yuichi Negishi 教授，现任东京理科大学先进材料多学科研究所教授。2001年获得庆应义塾大学博士学位，（导师：*Kaya Koji*教授和*Nakajima Atsushi*教授）。作为高级研究员，他在国际顶级期刊上发表了 190 多篇出版物，如*Jacs*, *Angew*, *AFM*, *Aggregate*, *Small*等。总引用次数超过 12000次。他的研究领域包括物理化学、团簇化学和纳米材料化学。他的显著成就包括日本化学会青年化学家、日本分子科学学会青年科学家奖、八神奖、2018年新型材料及其合成杰出奖和日本分子科学学会国际研究员奖，2021年日本化学会创意作品奖，2023年*Mukai*奖（东京大坂科学技术促进基金会）等荣誉。

报告摘要：

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. This presentation summarizes our recent works concerning these topics.

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