

## **The 7th Green and Sustainable Chemistry Award**

**Professor Noritaka Mizuno**

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*Development of Selective Oxidation Systems by Fine Control of Metal Oxide Cluster Catalysts*

Oxidation reactions are very important in industry and the developments of highly atom-efficient catalytic selective oxidation processes with environmentally friendly molecular oxygen or hydrogen peroxide have extensively been demanded because the byproduct is water. (1) Dr. Mizuno elucidated the relationship among structures, functions, and catalytic properties for selective oxidation of hydrocarbons with solid polyoxometalate compounds, including the roles of additives at atomic levels. In addition, (2) he succeeded in the developments of highly atom-efficient catalytic systems for selective oxidations of alkanes, alkenes, and alcohols with hydrogen peroxide or molecular oxygen by fine design and synthesis of novel polyoxometalates with the basic knowledge of (1). (3) As easily separable, collectable, and recyclable catalysts, (a) the immobilized polyoxometalates or polyoxometalate complexes and (b) metal hydroxides supported on appropriate supports for the selective oxidation with molecular oxygen without solvents or in water, have been developed.

As above described, Dr. Mizuno succeeded in the developments of catalytic systems for the environmentally friendly selective oxidation with control of structures and functions of catalytically active sites, and significantly contributed to the green chemistry.