

Shape and composition-controlled metallic nanocrystals for catalytic applications

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We are controlling size, shape and composition of metal nanocrystals to develop catalysts with better activity and selectivity. Atomic arrangement on the surface is changed by controlling the shape of metal nanocrystal. Since most of the chemical reaction occurs via chemical adsorption of reactants on the catalyst surface, change in atomic arrangement can cause a large difference in catalytic activity and selectivity. This effect can be shown clearly in various electrocatalytic reactions. Combining with control in composition, novel electrocatalysts with better catalytic properties have been developed in our lab. As examples, platinum nanocrystals with various shape were prepared and their activity and selectivity were evaluated for various catalytic reactions of gas phase hydrogenation and electrocatalytic reactions. Au@Pt composite nanocrystals were also synthesized and their electrocatalytic properties were investigated.