**Surface Regulations on the Heterogeneous Catalysts**

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Catalytic activity of heterogeneous catalysts is determined by their surface properties. Controllable surface engineering has the potentials to improve catalytic activity and chemoselectivity. Herein, cerium oxide is discussed as the demo catalysts for various catalytic reactions. Catalytic activity of CeO2 is strongly depended on their reversible Ce3+/Ce4+ redox cycle and their surface defects. Among them, porous nanorods of ceria (*PN*-CeO2), a previously unknown nanostructured form, exhibit a very high concentration of surface defects and extremely large oxygen storage capacity of 900 μmol-O2/g. Their catalytic activity as the active components, as additives or as the supports for the highly dispersed sub-nanometric metal clusters (Pt, Pd, Au, Ru, Ir, *et.al*) is explored for various catalytic reactions including low temperature CO oxidation, photocatalysis, hydrogenation reactions, electrocatalytic water-splitting and biomimetic catalysis. Synthesis of novel transition metal (Cu, Co, Zn et.al.)-based catalysts and their catalytic activity are also included in this talk.

Resume:

Dr. Yongquan Qu received his B.S. from Nanjing University, M.S. from Dalian Institute of Physical Chemistry, CAS, Ph.D. from the University of California, Davis. Afterwards, he joined Prof. Xiangfeng Duan's group at University of California, Los Angeles for postdoctoral research. He became a faulty member of Center for Applied Chemical Research, Frontier Institute of Science and Technology, Xi’an Jiaotong University, China at 2012. Dr. Qu was selected as the National 1000 Youth Plan at 2012. His research is focused on the heterogeneous catalysis in areas of organic synthesis, clean energy production and environmental remediation.