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## Selectivity control of Au-catalyzed oxidation of glycerol in water

Oxide-supported Au nanoparticles are known as efficient catalyst for aerobic oxidation of aqueous glycerol (GL) under the presence of NaOH (base), with glyceric acid (GLA) being the main product. In the absence of NaOH or under neutral (and even acidic) conditions, however, the same reaction over Au catalyst would feature a specific selectivity for dihydroxyacetone (DHA) production. This proposed presentation will show firstly that in the absence of any Au catalyst the reaction rate and product distribution of the GL oxidation reaction depends critically on the concentration of NaOH in the (water) solution, and disclose that NaOH is actually a homogeneous catalyst for the reaction. A well-developed Au/ZrO<sub>2</sub> will then be employed to feature the characteristics of Au catalyst for GL oxidation under the presence of various amounts of NaOH, highlighting an important role of the solution basicity to the catalysis of Au in the GL oxidation reaction. To understand the effects of the support surface acid-base property on the Au catalysis, a series Au/MgO-Al<sub>2</sub>O<sub>3</sub> samples, with widely varied surface acid-base property according to the composition (Mg/Al) of the support, are prepared and employed as the alternatives of Au/ZrO<sub>2</sub> for the GL oxidation reaction. It will be shown that Au nanoparticles on the most acidic (least basic) support exhibit the highest activity for GL activation and highest selectivity for DHA production. Increasing the basicity while lowering the acidity at the support surface leads to continuously improved selectivity for GLA, at the expense of DHA. Discussion will be made to uncover the role of basic species/sites, either in the solution or at the support surface of Au catalyst, for the selectivity control of GL oxidation in water.

## Biography

Bo-Qing Xu received his BS in Chemistry at Jiangxi University (1982), Master (1985) and PhD (1988) degree in Physical Chemistry at Dalian Institute of Chemical Physics, Academia Sinica. He started his career as a Professor at Dalian University of Technology in 1992, worked as a visiting scientist at Northwestern University (USA, 1995 & 1997) and Georgia Tech (USA, 1996), he moved to Tsinghua University in 1998. He has also worked as a research student at Hokkaido University (Japan, 1986-1988), a short-term visiting Professor at UC Berkeley (2002) and Hong Kong Baptist University (2003). His name appears on the Editorial Board of *Applied Catalysis A-General and International Journal of Oil, Gas and Coal Technology*, International Advisory Board of Acid-Base Catalysis Group (ABC). He works in the field of Heterogeneous Catalysis with main interest on the physical chemistry aspects of new catalytic materials and catalytic reactions. Zi-Fei Yuan is a PhD student in the Heterogeneous Catalysis Laboratory of Professor Bo-Qing Xu at the Department of Chemistry, Tsinghua University. She has published 2 papers based on her PhD work.

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