

## Green Syntheses of Zeolites and Design of an Efficient Heterogeneous Catalysts for Conversion of Sugars to HMF

Prof. Dr. Feng-Shou Xiao

(Department of Chemistry, Zhejiang University,  
Hangzhou, China)



2015年7月2日(木) 15:30–17:00

(創成科学研究棟4階セミナー室B・C)

<http://www.cat.hokudai.ac.jp/access.html>

As important industrial materials, microporous zeolites are necessarily synthesized in the presence of templates and solvents under hydrothermal conditions. This hydrothermal synthesis of zeolites is not green, based on the concept of green chemistry, due to the use of organic templates, the presence of high pressure, low efficiency, and production of polluted waters. In our cases, at first it is successful to synthesis of zeolites in the absence of organic templates (template-free), later it is demonstrated a green route for synthesizing zeolites under solvent-free conditions [1]. Recently, the combination of template-free and solvent-free routes for synthesizing zeolites is also successful [2]. These approaches in the synthesis not only significantly reduces the waste production, but also greatly increases the yield of zeolite products. In addition, the conversion of sugars to HMF has been paid much attention, but it still has a challenge that it is inevitably formed by-products due to the hydration of HMF. After theoretical simulations and rational synthesis, it is obtained that a superhydrophobic mesoporous acid can completely prevent HMF hydration, giving HMF as sole product from full conversion of fructose [3]. The excellent catalytic data in the conversion of fructose to HMF is attributed to the unique superhydrophobicity of the solid acid.

References: [1] L.M. Ren, Q.M. Wu, C.G. Yang, L.F. Zhu, C.J. Li, P.L. Zhang, H.Y. Zhang, X.J. Meng, and F.-S. Xiao, *J. Am. Chem. Soc.*, 134 (2012) 15173. [2] Q.M. Wu, X. Wang, G.D. Qi, Q. Guo, S.X. Pan, X.J. Meng, J. Xu, F. Deng, F.T. Fan, C. Li, S. Maurer, U. Muller, and F.-S. Xiao, *J. Am. Chem. Soc.* 136 (2014) 4019. [3] L. Wang, H. Wang, F.J. Liu, A.M. Zheng, J. Zhang, Q. Sun, J.P. Lewis, L.F. Zhu, X.J. Meng, F.S. Xiao, *ChemSusChem*, 7(2014)402.

問合せ先: 触媒化学研究センター・福岡淳 (fukuoka@cat.hokudai.ac.jp・011-706-9140)

Prof. Feng-Shou Xiao received his B.S. and M.S. degrees in Jilin University, China. From there he moved to the Catalysis Research Center, Hokkaido University, Japan, where he was involved in collaborative research between Dalian Institute of Chemical Physics & Jilin University, China with Hokkaido University, Japan. He was a Ph.D. student there for two years and was awarded his Ph.D. degree at Jilin University in 1990. After postdoctoral work at the University of California at Davis, USA, he joined the faculty at Jilin University in 1994, where he became a full and distinguished professor of Chemistry. Since the end of 2009, Dr. Xiao as a distinguished professor has moved to Department of Chemistry, Zhejiang University. His research is mainly focused on zeolites, nanoporous materials, and catalysis.