报告题目：沸石材料的工业绿色制备与环境和能源催化应用

个人简介：

Prof. Feng-Shou Xiao received his B.S. and M.S. degrees in the Department of Chemistry, 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 professor in 1996 and distinguished professor in 2003. Since the end of 2009, Dr. Xiao as a distinguished professor has moved to Department of Chemistry, Zhejiang University. As a secretary, he has been serving for the Asia-Pacific Association of Catalysis Societies since 2004. His research is mainly focused on zeolites, porous materials, and catalysis. He is the author or co-author of more than 400 peer-reviewed scientific publications and 50 patents. He has been an associate editor of Industrial & Engineering Chemistry Research since 2017, and is an Editorial Board Member of Chinese Journal of Catalysis, Journal of Energy Chemistry, Catalysis Survey from Asia, and ChemCatChem.

报告摘要：

沸石分子筛材料的工业绿色制备：当前工业广泛使用的沸石分子筛催化材料一般都是通过水热路线来制备的，有时还使用了大量的有机模板剂，有时又使用大量的氟离子。沸石分子筛的水热合成导致了大量废水的排放，昂贵的有机模板剂的使用一方面提高沸石分子筛的成本另一方面还形成了大量的污染废水并且焙烧有机模板又形成了大量废气，而氟离子的使用造

成了不可降解的废物产生，造成了工业生产困难。我们在研究了沸石分子筛晶化过程后认识到，水的主要角色是“催化作用”而有机模板剂的主要作用是导向沸石晶核的形成。因此，我们提出了沸石合成过程中不添加水溶剂，仅仅通过原料中所具备的结晶水就可以实现无溶剂合成沸石分子筛催化材料；通过在合成沸石的起始体系中加入沸石晶种而不加入有机模板剂就可以实现无有机模板合成沸石分子筛；通过不加入水的环境来替代加入氟离子合成纯硅沸石材料。幸运的是，所提出的这些合成策略很快在不同的合成体系中实现，并且三种产品实现了工业化生产：在不加入氟离子的情况下实现了纯硅Beta沸石合成；采用低成本的铜胺配合物替代昂贵的有机模板合成Cu-SSZ-13；无有机模板合成的硅铝ZSM-22沸石分子筛。

环境与能源催化应用：将上述工业合成的沸石分子筛材料在引入不同的催化活性组分后，成功地制备出高活性的催化材料。例如，将Beta沸石担载Pt纳米颗粒后，制备出室温下可实现甲醛催化转化为二氧化碳的新型室内空气清新催化材料；所合成的低成本的Cu-SSZ-13在SCR-NH_3反应中显示出优异性能；无有机模板合成的ZSM-22担载Pt催化剂在加氢异构反应中显示出优异性能；沸石分子筛晶体包裹的传统金属催化材料显示出不同寻常的高活性和稳定性。