学 术 报 告

Metal Carbides as Potential Alternative Electrocatalysts

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报告地点：生物楼学术报告厅

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报告人简介：

Jingguang Chen received his B.S. degree in Chemistry from Nanjing University in 1982 and was selected by the China-USA Chemistry Graduate Program (CGP) in the same year. He received his Ph.D. degree from the University of Pittsburgh in 1988. He then spent one year in Germany as a Humboldt Postdoctoral Fellow. He started his career at the Exxon Research and Engineering Company in Annandale, NJ in 1989. In 1998 he accepted a faculty position at the University of Delaware. Currently he is the Director of the Center for Catalytic Science and Technology (CCST) and Professor of Chemical Engineering. He has over 150 publications in refereed journals and 16 United States patents. He is very active in serving the surface science and catalysis communities, including responsibilities as the Chair for the Gordon Research Conference on Catalysis in 2002, the Chair of the Philadelphia Catalysis Club in 2004, the Board of Directors for the North American Catalysis Society, and the Catalysis Secretary-General of the American Chemical Society.

报告摘要：

As the global supply of fossil fuels predictably diminishes, there have been overwhelming interests in developing the fuel cell technology, such as polymer electrode membrane (PEM) fuel cells for the electro-oxidation of hydrogen and methanol. Currently, the anode electrocatalysts for the PEM system are Pt and Pt/Ru. However, the Pt and Pt/Ru catalysts are disadvantageous in terms of the prohibitively high costs and their susceptibility to be poisoned by CO. As a result, the discovery of less expensive and more CO-tolerant alternatives to the Pt and Pt/Ru electrocatalysts would greatly facilitate the commercialization of PEM fuel cells.

The carbides of Groups IV-VI early transition metals often show catalytic properties similar to those of the Pt-Group metals [1]. Recently our research group has performed extensive studies of utilizing tungsten and molybdenum carbides as potential electrocatalysts [2-6]. In this presentation we will first provide a comparison of the general trend in the activity and product selectivity of hydrogen and methanol on single crystal surfaces of metal carbides under well-controlled ultrahigh vacuum (UHV) conditions. We will then discuss the synthesis of phase pure tungsten carbide electrodes using Physical Vapor Deposition (PVD) to bridge the “materials gap” between single crystal surfaces and polycrystalline films. We will

finally present our results of the electrochemical evaluation of the tungsten carbide electrodes to bridge the “pressure gap” between UHV environment and electrochemical conditions.

报告联系人：张涛

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