

快报

PTFE含量对Pt/C/PTFE疏水催化剂氢水液相催化交换性能的影响

胡胜, 肖成建, 朱祖良, 罗顺忠, 王和义, 罗阳明, 王昌斌

中国工程物理研究院 核物理与化学研究所, 四川 绵阳 621900

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摘要 研究采用液相还原法制备10%Pt/C催化剂, 再将其与PTFE一起负载于多孔金属载体, 制备Pt/C/PTFE疏水催化剂。用XRD表征Pt/C催化剂上Pt晶相结构和粒径大小, Pt粒子平均粒径为3.1 nm; SEM表征PTFE与Pt/C催化剂的分散状态, 二者基本混合均匀, 局部地方有因未均匀分散而形成的PTFE膜。由于催化剂疏水性不够, PTFE与Pt/C质量比为0.5:1时, Pt/C/PTFE催化剂活性较低, 比例增至1:1, 催化剂活性明显增加, 而继续增加PTFE比例, 有更多的Pt活性位被包覆在PTFE中, 同时催化剂内扩散效应增加, 催化剂活性又逐渐降低。对多孔金属载体预处理, PTFE与Pt/C质量比为0.5:1时, Pt/C/PTFE催化剂活性增加, 而比例升为1:1时, 催化剂活性降低。

关键词

PTFE; 疏水催化剂; Pt/C/PTFE; 氢水液相交换反应; 氢同位素分离

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Catalytic Activity of Hydrophobic Pt/C/PTFE Catalysts of Different

PTFE Content for Hydrogen-Water Liquid Exchange Reaction

HU Sheng, XIAO Cheng-jian, ZHU Zu-liang, LUO Shun-zhong,
WANG He-yi, LUO Yang-ming, WANG Chang-bin

China Academy of Engineering Physics, P.O.Box 919 214, Mi anyang 62190
0, China

Abstract 10%Pt/C catalysts were prepared by liquid reduction method. PTFE and Pt/C catalysts were adhered to porous metal and hydrophobic Pt/C/PTFE catalysts were prepared. The structure and size of Pt crystal particles of Pt/C catalysts were analyzed by XRD, and their mean size was 3.1 nm. The dispersion state of Pt/C and PTFE was analyzed by SEM, and they had good dispersion mostly, but PTFE membrane could be observed on local parts of Pt/C/PTFE surface. Because of low hydrophobicity, Pt/C/PTFE catalysts have low activity when the mass ratio of PTFE and Pt/C is 0.5:1, and their catalytic activity increases markedly when the ratio is 1:1. When the ratio increases again, more Pt active sites would be covered by PTFE and interior diffusion effect would increase, which result in the decrease of catalytic activity of Pt/C/PTFE. By PTFE pretreatment of porous metal carrier, the activity of Pt/C/PTFE catalysts decreases when the mass ratio of PTFE and Pt/C is 0.5:1, and their activity decreases when the mass ratio is 1:1.

Key words PTFE hydrophobic catalysts Pt/C/PTFE catalysts hydrogen-water liquid exchange reaction hydrogen isotope separation

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