

研究论文

## PtRu/C电催化剂上甲醇吸附氧化过程的电化学原位红外光谱

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收稿日期 2005-12-14 修回日期 网络版发布日期 2006-11-6 接受日期

**摘要** 采用调变的多元醇法制备了高分散的Pt/C, PtRu/C和Ru/C电催化剂. XRD计算结果表明, PtRu/C电催化剂的平均粒径和合金度分别为2.2 nm和71%. 采用电化学方法和原位傅里叶变换红外反射光谱方法(*in situ* FTIRS)研究了甲醇在3种电催化剂上的吸附氧化过程, 发现PtRu/C对甲醇的催化活性明显高于Pt/C, Ru的加入一方面影响了甲醇在Pt上的解离吸附性能, 另一方面提供了Ru-OH物种, 从而抑制了低电位下电催化剂中毒. 红外光谱研究结果表明, 线性吸附态CO(CO<sub>L</sub>)是主要毒化物种, 反应产物主要是CO<sub>2</sub>, 还有少量的甲酸甲酯. 根据实验结果讨论了甲醇在PtRu/C电催化剂上的氧化机理.

**关键词** [直接甲醇燃料电池](#) [PtRu/C](#) [甲醇氧化](#) [电化学](#) [in situ FTIRS](#)

**分类号** [O643.3](#) [TM911.4](#)

## *In situ* Electrochemical FTIR Spectroscopy of Adsorption and Oxidation Process of Methanol on PtRu/C Electrocatalyst

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**Abstract** A modified polyol process was used to prepare Pt/C, PtRu/C and Ru/C electrocatalyst. Calculated from XRD patterns, the mean particle size of PtRu/C electrocatalyst was 2.2 nm and the percentage of Ru alloyed was 71%, respectively. Adsorption and electro-oxidation process of methanol on PtRu/C electrocatalyst was investigated by *in situ* FTIRS, combined with electrochemical experiments. It is revealed that the activity of PtRu/C electrocatalyst for methanol oxidation was much higher than that of Pt/C. Addition of Ru in PtRu/C electrocatalyst changed the characteristic of methanol adsorption, and Ru—OH species could oxidize linear bonded CO(CO<sub>L</sub>) at a lower potential, thus inhibited the catalyst poisoning. In addition, from FTIR results, CO<sub>L</sub> was evidently identified to the main poisonous species and the major product was CO<sub>2</sub>. Methyl formate was also identified. Based on these results, the mechanism of methanol oxidation was discussed.

**Key words** [Direct methanol fuel cell](#) [PtRu/C](#) [Methanol oxidation](#) [Electrochemistry](#) [In situ FTIR](#)

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