



红外光谱电化学研究金电极表面上CO<sub>2</sub>的还原  
FTIR Spectroelectrochemistry Study on the Reduction of CO<sub>2</sub> at a Gold Electrode Interface

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英文关键词: [CO<sub>2</sub>](#) [electrochemical reduction](#) [FTIR spectroelectrochemistry](#)

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中文摘要:

以碳酸丙烯酯(PrC)为溶剂, 高氯酸四丁基胺(TBAP)为电解质, 利用电化学及红外光谱电化学开展了金电极上二氧化碳的还原研究。运用现场红外光谱跟踪电化学还原过程反应物及产物的生成和消失。红外光谱电化学循环伏吸法表明, 在消耗CO<sub>2</sub>的同时, 金电极上有CO的产生, 且伴随有碳酸根的形成。结合电化学和光谱电化学结果, 提出了一种电还原机理: 在非水介质中, CO<sub>2</sub>电还原过程中生成了中间体CO<sub>2</sub><sup>•-</sup>, 随后CO<sub>2</sub><sup>•-</sup>分别以两个途径进行还原, 其一是直接被还原成CO, 其二是与CO<sub>2</sub>结合生成C<sub>2</sub>O<sub>4</sub><sup>•-</sup>而后歧化成CO以及CO<sub>3</sub><sup>2-</sup>。两个反应同时进行, 且第一个反应是可逆过程。

英文摘要:

Electrochemistry and FTIR spectroelectrochemistry methods were used for investigating the reduction of CO<sub>2</sub> on gold surface in propylene carbonate (PrC) including tetrabutyl ammonium perchlorate (TBAP) as electrolyte. By using the infrared spectroelectrochemistry cyclic voltabsorptometry (CVA), it is found that with the decrease of CO<sub>2</sub>, the CO and CO<sub>3</sub><sup>2-</sup> were produced. Combined with the results obtained from electrochemistry and FTIR spectroelectrochemistry, the electrochemical reduction mechanism of CO<sub>2</sub> in the non-aqueous media is proposed: CO<sub>2</sub><sup>•-</sup> was generated firstly, and then CO<sub>2</sub><sup>•-</sup> reduced to CO by two pathways. One is electrochemically reduced to CO directly, the other is CO<sub>2</sub><sup>•-</sup> radicals reaction with CO<sub>2</sub> to generate C<sub>2</sub>O<sub>4</sub><sup>•-</sup>, then leading to formation of CO and CO<sub>3</sub><sup>2-</sup>. Both of them carried out at the same time the former is reversible process.

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