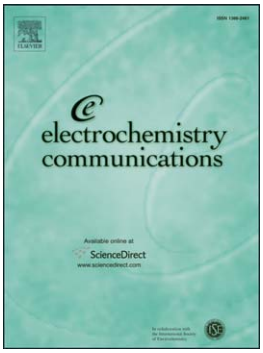

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Quantum interference effect of single-molecule conductance influenced by insertion of different alkyl length

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Abstract:
In this work, the conductance of molecules with different alkyl length between benzene and carboxylic acid at each side are explored by electrochemical jump-to-contact STM break junction. The results show that the quantum interference (QI) is found in *meta*-phenylenedipropionic acid containing two methylene groups between benzene ring and carboxylic acid, and there is no obvious QI effect for *meta*-phthalic acid and *meta*-phenylenediacetic acid with shorter alkyl between benzene and carboxylic acid. We attribute the disappearance of the QI in *meta*-phthalic acid and *meta*-phenylenediacetic acid to the strong interaction between the benzene ring and anchoring group when they are too close. The current result reveals the importance role of alkyl chain on benzene ring and anchoring group in QI effect.

Keywords: Carboxylic acid; Quantum interference; Alkyl length; Scanning tunneling microscopy break junction

1. Introduction

While molecular electronics is becoming increasingly under focus, there are still major issues in understanding the conduction properties of single molecules.[1-6] Generally, the electronic properties of single molecule are measured through single