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Charge transport through or between single molecules

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Understanding the electron transport through a single molecule is preliminary for realizing the ultimate goal of molecular electronics. A great number of researches on investigating and controlling the electronic property of single molecules have been done in the past 20 years. To go a step further, the electron transport between single molecules has then been regarded as the next challenge for building the molecular-scale circuit. In this presentation, we report our recent works on the electron transport investigation through a single molecule or between single molecules. The molecules are connected by disulfide bond or self-assembled by weak interaction, like hydrogen bond. We found that the characteristics of the intermolecular force play an important role in the conductance of the molecular devices, which determines the planarity of the assembled structure. The dihedral angle of the S-S bond tends to take a perpendicular conformation. This non-conjugated structure localizes the electron distribution and accounts for the low conductivity of the disulfide linkage. Electron transport properties through an assembled supramolecular junction bridged by quadruple hydrogen bonds in a polar solvent showed a statistical conductance value that approaches 10- 3 G0, which is comparable with that of fully-conjugated single molecular devices. Our work suggests that a supramolecular assembly could also help to build a highly conductive molecular electronics device, which offers a new design strategy and further extends the material library for future molecular electronic devices.

Biography

Wang Lin has received her BE from the Department of Chemistry at Jilin University and PhD degree from Institute of Chemistry, Chinese Academy of Sciences (ICCAS). She is currently an Assistant Professor in the Department of Material Science and Engineering, China University of Geosciences, Beijing, China. Her research interest is in the field of molecular electronics with specific focus on the charge transport through self-assembled single molecular devices.

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