# CONTROLLING ELECTRON TRANSPORT IN SINGLE MOLECULES

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Understanding and controlling charge transport in single molecules is a basic task in molecular electronics, and directly relevant to charge transfer in molecules, a phenomenon that plays critical roles in many chemical and biological processes. We have studied charge transport through single molecules attached to two electrodes in electrolytes. The molecules include benzene dithiol, perylene derivatives, and single layer graphene sheet, which share the same building block, aromatic ring. The HOMO-LUMO gap of the molecules decreases with the number of benzene rings and becomes zero in the case of graphene. We have measured transport current through the molecules as a function of electrochemical gate voltage. The gate effect is small (less than 50%) in the case of benzene dithiol, but it can change the conductance of the perylene derivatives by 2-3 orders of magnitude. Graphene is highly conductive with a remarkably high mobility but the gate effect is weak. We discuss the different charge transport mechanisms in these polycyclic aromatic hydrocarbons.