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## The electronic conductance of polypyrrole (PPy) molecular wires and emergence of Fano resonance phenomena

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### Abstract

In this paper, we studied the electronic conductance of a polypyrrole polymer, which is embedded between two semi-infinite simple chains by using Green's function technique in tight-binding approach. We first reduced the center polymer to a one dimensional chain with renormalized onsite and hopping energies by renormalization method. Then, we calculated the system conductivity as a function of incoming electron energy, polymer length and contact hopping terms. The results showed that by increasing polymer length and decreasing contact hopping energies, the conductance decreases in the gap regions. This means that for larger gaps, the electron tunneling happens with more difficulty. Moreover, at the resonance area, due to the existence of nitrogen atom in the polymer cyclic structure, the Fano resonance will emerge. Furthermore, the polymer can behave like a metallic chain by variation of the value of nitrogen on-site term.

**Keywords:** Polypyrrole, conductance, tight-binding, renormalization, Green's function

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