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Length and temperature dependent crossover of charge transport across molecular junctions YA-LIN LO, Department of Physics, National Taiwan University, SHIH-JYE SUN, Department of Applied Physics, National University of Kaohsiung, YING-JER KAO, Department of Physics, National Taiwan University — We study the electronic transport in a molecular junction, in which each unit is coupled to a local phonon bath, using the non-equilibrium Green's function method. We observe the conductance oscillates with the molecular chain length and the oscillation period in odd-numbered chains depends strongly on the applied bias. This oscillatory behavior is smeared out at the bias voltage near the phonon energy. For the phonon-free case, we find a crossover from tunneling to thermally activated transport as the length of the molecule increases. In the presence of electron-phonon interaction, the transport is thermally driven and a crossover from the thermally suppressed to assisted conduction is observed.

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