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Electronic transport through a ladder nanostructure in the presence of network defects

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Abstract

The present research studied the electronic transport of an ideal infinite ladder nanostructure in the presence/absence of network defects by using Green's function method at the tight-binding approximation. The network defects can be simulated by considering a finite ladder which is connected via two contacts to two similar infinite ladders. The results showed that the hopping energy of rungs determines the overlapping region of the ladder conductance channels. By increasing hopping energy of rungs, the allowed energy region of the ladder increases, while the overlapping region shrinks and eventually vanishes. Creation of branched bonds in the center ladder leads, through the system, to a harder electron tunneling. Moreover, the closer electron energy to the system gap edges leads to a better tunneling.

Keywords: ladder nanostructure, network defect, Green's function, electronic conductance

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