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Design of electronic devices based on carbon nanotubes heterojunction contacts to Zn ring layers

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Abstract

In recent years, due to electron transport properties of nanostructures based on carbon nanotubes, a lot of attention to design electronic devices in the field of nanotechnology has attracted. There are three types of carbon nanotubes in zigzag, armchair and chiral (asymmetrical) forms. Since the types of armchair are electrically conductive, by a combination with a metal such as zinc can be achieved by various means distinct applications. In this respect, we select different layers of circular connectors on the number of atoms of 10, 20 and 30, respectively, in the systems A-Zn10-A, A-Zn20-A and A-Zn30-A, where (A: armchair). Our calculations are based on the Green's function method within tight-binding approximation in the nearest neighbors in the framework of Landauer. The results are able to predict that devices with different functions such as quantum conductor wire, negative differential resistance and rectifier design. The results may be useful in the design of electronic devices at the nanometer scale.

Keywords: electrical transport, tight-binding, green's function, carbon nanotube, Zn ring layers

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