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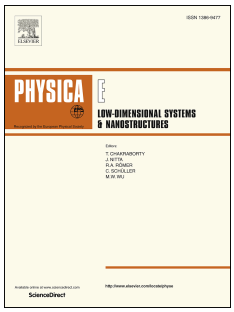


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# Electronic and Transport Properties of BCN Alloy Nanoribbons

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## Abstract

The dependence of the carbon (C) concentration on the electronic and transport properties of boron carbonitride (BCN) alloy nanoribbons have been investigated using surface Green's functions technique and random Hamiltonian model by considering random hopping parameters including first and second nearest neighbors. Our calculations indicate that substituting boron (nitrogen) sites with carbon atoms induces a new band close to conduction (valence) band and carbon atoms behave like a donor (acceptor) dopants. Also, while both nitrogen and boron sites are substituted randomly by carbon atoms, new bands are induced close to both valence and conduction bands. The band gap decreases with C substituting and the number of charge carriers increases in low bias voltage. Far from Fermi level in the higher range of energy, transmission coefficient and current of the system are reduced by increasing the C concentration. Based on our results, tuning the electronic and transport properties of BCN alloy nanoribbons by random carbon dopants could be applicable to design nanoelectronics devices.

**Keywords:** BCN nanoribbons, Surface Green's function, Non-equilibrium Green's function, Transfer Matrix, I-V characteristics, Transmission coefficient.