

Abstract Submitted
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Multiple Quantum Well Structures of Graphene¹ HALDUN SEVINCLI, Department of Physics, Bilkent University, Ankara 06800, Turkey., MEHMET TOPSAKAL, SALIM CIRACI, UNAM-Institute for Materials Science and Nanotechnology, Bilkent University, Ankara 06800, Turkey. — Based on first-principles calculations we predict that periodically repeated junctions of graphene ribbons of different widths form multiple quantum well structures having confined states. These quantum structures are unique, since both constituents of heterostructures are of the same material. The width as well as the band gap, even the magnetic ground state for specific superlattices are modulated in direct space. Orientation of constituent ribbons, their width and length, the symmetry of the junction and their functionalization by adatoms are structural parameters to engineer electronic and magnetic properties of the quantum structure. Not only the size modulation, but also composition modulation such as the heterojunction of BN in honeycomb structure and graphene gives rise to confined states. Devices made from these graphene quantum structures display negative differential resistance.

¹Part of the computations has been carried out by using UYBHM at Istanbul Technical University.

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