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Electronic properties of multilayered nanographite ribbons in an electric field. YUAN-CHENG HUANG, Center for General Education, Kao Yuan University , Kaohsiung 821, Taiwan, Department of Physics, National Cheng Kung University, Tainan 701, Taiwan, — The low-energy electronic properties of the AB-stacked multilayered nanographite ribbons in an electric field are studied through the tight-binding model. They are strongly dependent on the geometric structures (the interlayer interactions, the ribbon edges, the ribbon width, and the ribbon number) and the field strength. The interlayer interactions significantly affect energy dispersions, energy gap (E_g), density of states (DOS), and free carriers. DOS exhibits many special structures, including plateau, discontinuities, and divergent peaks. The electric field leads to the shift of the Fermi level (E_F), the production of the new edge state, the change of the band gap, the alternation of the subband spacing, and the semiconductor-metal transitions. In gapless zigzag ribbons, the electric field not only lifts the degeneracy of flat bands at E_F but also induces an energy gap. E_g is dependent on the ribbon width and the field strength. The semiconductor-metal transitions occur in both armchair ribbons and zigzag ribbons in the increase of the electric field. The above-mentioned effects due to electric field is completely reflected in the features of DOS such as the generation of special structures, the shift of peak position, the change of peak height, and the alternation of band gap.

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