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Strain Modulation on electric-optical properties of Graphene and ZnO micro/nanowires XUEWEN FU, ZHIMIN LIAO, HANCHUN WU, YANGBO ZHOU, JUN XU, School of physics, Peking University, Beijing, China, WANLIN GUO, Institute of Nano Science, Nanjing University of Aeronautics and Astronautics, Nanjing 210016, P. R. China, Nanjing, China, DAPENG YU, School of physics, Peking University, Beijing, China — Strain increasingly prevails in micro- and nanostructures, and has important influence on the crystal and electronic structures. But its role in these structures remains unclear. The strain dependence of conductance of monolayer graphene has been studied here. The results illustrate the notable transitions: the slight increase, the dramatic decrease, and the sudden dropping of the conductance by gradually increasing the uniaxial strain. The graphene conductance behaves reversibly by tuning of the elastic tensile strain up to 4.5%, while it fails to recover after the plastic deformation at 5%. We also investigated the bending strain effect on the photoresponse of ZnO micro/nanowires and found larger photoconductivity and faster rising speed when photo-excitation is localized at the bending region in atmospheric environment, while the rising speeds are almost the same when photo-excitations are localized at the bending and straight regions under vacuum. The bending strain induced improvement of the UV photoresponse in air was well explained by the coupling of piezoelectric effect and surface oxygen adsorption/desorption procedure on the bent ZnO microwire.
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