Electronic structure of a realistic model of amorphous graphene

VITALIY KAPKO, AVISHEK KUMAR, Arizona State University, DAVID DRABOLD, Ohio University, MICHAEL THORPE, Arizona State University — We calculate the electronic properties of a realistic atomistic model of amorphous graphene. The model contains odd-membered rings, particularly five and seven membered rings and no coordination defects. We show that odd-membered rings increase the electronic density of states at the Fermi level relative to crystalline graphene; a honeycomb lattice with semimetallic character. Some graphene samples contain amorphous regions, which even at small concentrations, may strongly affect many of the exotic properties of crystalline graphene, which arise because of the linear dispersion and semi-metallic character of perfectly crystalline graphene. Estimates are given for the density of states at the Fermi level using a tight-binding model for the $\pi$ states. We also report preliminary density functional results for the electronic structure.