Carbon chains grown perpendicularly on graphene: Nanobrush

CAN ATACA, Department of Physics, Bilkent University, Ankara, Turkey, 06800, SALIM CIRACI, Department of Physics, Bilkent University, Ankara, Turkey, 06800; UNAM-Material Science and Nanotechnology, Bilkent University, Ankara, Turkey, 06800. — We predict a peculiar growth process, where carbon adatoms adsorbed to graphene readily diffuse above room temperature and form linear chains. These chains grow longer on graphene through insertion of carbon atoms one at a time from the bottom end. Through this growth process two allotropic forms of carbon, namely graphene and polyynes are combined to make several novel nanostructures. Brush like graphene sheets with protruding polyynes can achieve chemical activity and attain new functionalities.