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Hydrogen adsorption induced structural and electronic changes in graphene grown on metal substrate SRIVATS RAJASEKARAN, SARP KAYA, TOYLI ANNIYEV, HIROHITO OGASAWARA, ANDERS NILSSON, Stanford Synchrotron Radiation Lightsource, FAN YANG, DARIO STACCHIOLA, Chemistry Department, Brookhaven National Laboratory, FRANK-ABILD PEDERSON, JENS NORSKOV, SUNCAT, STANFORD SYNCHROTRON RADIATION LIGHTSOURCE TEAM, CHEMISTRY DEPARTMENT, BROOKHAVEN NATIONAL LABORATORY COLLABORATION, SUNCAT COLLABORATION — Graphene hydrogenation proposed to open a band gap has also been shown to be the case for graphene on metal substrates. Our carbon specific soft x-ray (photoelectron, absorption, emission) spectroscopy studies on single and few layer graphene on Pt(111) do not indicate band opening due to hydrogenation. The graphene layer is weakly interacting with the Pt(111) substrate but hydrogenation induces structural changes which lead to observation of density of states at the Fermi level (contrary to band opening hypothesis) due to strong hybridization with substrate. Hydrogenation observed to occur only on the surface atoms of few layers of graphene induces interlayer carbon-carbon bonding due to structural distortions initiated at the surface, i.e. propagation of sp^3 hybridization to underneath carbon layers. This structure is stabilized due to hybridization of the carbon atoms in the bottom layer with the Pt(111) substrate.

Srivats Rajasekaran
Stanford University/Stanford Synchrotron Radiation Lightsource

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