Chitosan as carbon precursor for CVD graphene growth

André do Nascimento Barbosa, Daniela Sayuri Sigeta, Fernando Lazaro Freire Jr

PUC-Rio

We report single-layer and bi-layer graphene synthesis using Chitosan as precursor. Unlike alkane and other fossil carbon precursors, Chitosan has a natural biological occurrence as it comes from marine biomass and, its molecular structure contains amine subgroups in its structure, therefore providing nitrogen for dopant incorporation. In addition, its stability proves to be a reliable carbon source for synthesis at lower temperatures and times, as well as partial pressure. Precursor pressure for synthesis is found to be at 5-15 mTorr range, as higher partial pressures we have had bilayer and few-layer cover of substrates, controlled by a first stage heat source to degrade the chitosan. We could lower the synthesis temperature from the usual 1000 °C Range down to 900 °C with average D/G of 0.8. The samples were grown on Copper provided by Alfa Aesar and transferred onto SiO2 wafers and fused silica via a wet transfer method using PU as sacrifice polymer layer. Characterization of graphene layers were made by using Raman Scattering spectroscopy with a 473 nm laser, Atomic force microscopy, optical microscopy, charge carrier mobility, visible light Transmittance was performed to provide information of the number of layers that were grown on our samples using UV-Visible light spectrophotometer.