Users' Meeting Template
Influence of Iron Precursor on Polymer-Templated Growth of Carbon Nanostructures for Surface-Enhanced Raman Scattering

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Abstract

In this report, we demonstrate the fabrication, by low-temperature pyrolysis, of high-quality, two-dimensional, nitrogen-enriched, carbon nanosheets (2D-NECNS) and one-dimensional, nitrogen-enriched, carbon nanoribbons (1D-NECNR) from spin-coated polymer thin films and electrospun poly(4-vinylpyridine) (P4VP) polymer nanofibers. As P4VP chains have functional pyridine rings available to bind with metal precursor ions through favorable interactions, iron (Fe) atoms might be incorporated into the carbon nanostructures with the aid of Fe(II) acetate during the synthesis. The incorporation of a metal salt can decrease the thermal stability of pyridinic groups so as to produce carbon nanostructures having a surface enriched with Fe-N bound species, which form because the N atoms in the aromatic rings bind directly to Fe atoms. The abundant Fe-N species in these carbon nanostructures enabled a superior enhancement of Raman signals of adsorbed dye molecules through a chemical mechanism, which offers great promise for the implementation of this system in a next-generation SERS substrate for molecular sensing.

Keywords - Surface-enhanced Raman scattering; SERS; nanosheets; nanoribbons