
Colloquium

Graphene Coating-enabled Surface Plasmon Coupled Emission and Optical Diode Action

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A single sheet of sp²-hybridized carbon atoms, called graphene, is presently the most widely studied material in the scientific community. Following a brief introduction of graphene and its unique properties, I will present strong evidence for the amplification of surface plasmon coupled emission (SPCE) from graphene-Ag hybrid films. SPCE is a novel analytical technique in which the isotropic emission of a fluorophore is combined with the surface plasma resonance of a Ag (or Au) thin film to yield highly directional emission from the so-called plasmaphore, and thus greatly increased sensitivity. We find a 40-fold amplification of rhodamine b fluorophore when graphene is used as the spacer layer in a conventional Ag-based SPCE setup. In another project, we harnessed the nonlinear properties of graphene in conjunction with those of C₆₀ to fabricate an all-optical analog of a diode. Our all-carbon optical diode, built from graphene and C₆₀ sandwiched structure, is passive, polarization independent and most importantly has no phase-matching constraints. Evidence for tunable nonreciprocity factor and potentially large bandwidth capability will be presented.

This work was done in collaboration with team members from Clemson University, USA (R. Podila, K. Lingam), Sri Sathya Sai Institute of Higher Learning, India (P. Mulpur, B. Anand, R. S. Sathish, S. R. Krishnan) and Raman Research Institute, India (R. Philip)

Friday, July 18th 2014

11:30 AM (Tea/Coffee at 11:15 AM)

Seminar Hall, TCIS