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One pot synthesis of acid doped polypyrrole and investigation of its visible light driven dye degradation and room temperature ferromagnetic properties

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In the present work, HCL- doped polypyrrole was prepared by the oxidative-polymerization [1] method. X-ray diffraction pattern depicts a broad amorphous peak centered around $2\theta = 23^\circ$, corresponding to scattering from the bare polymer chain [2]. TEM images revealed the sheet like morphology of the sample. The visible light driven photo degradation of Rhodamine B (RhB) and Methylene Blue (MB) dyes were carried out to study the photocatalytic performance of the sample. Field dependent room temperature M-H behavior of the sample was also studied. In both cases, the sample showed 99.99% degradation of the dyes at around 25 minutes. The sample showed a trace of ferromagnetism at room temperature (RT-FM) with coercivity around 120 Oe and saturation magnetization around 1.5×10^{-3} emu/gm. For nonmagnetic polypyrrole, this observation is a bit striking. This phenomena may be correlated to the defect related ferromagnetism as generally observed in chemically synthesized graphene or its nanocomposites [3]. Simultaneously, in the case of conducting polymers, the process of doping (intercalation) breaks the double bond of the polymeric chain and produces a positively charged defect and a dangling bond. These two factors results the formation of a positive polaron. The ferromagnetic ordering of polarons may induce ferromagnetism into the sample.

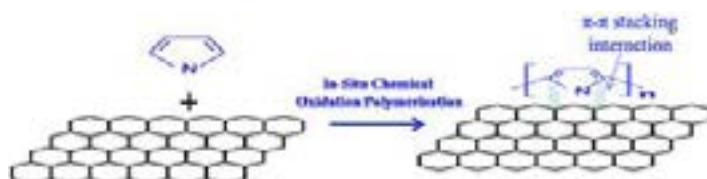


Figure1: In situ polymerization of polypyrrole

Biography

Sanchayita Nag has expertise in synthesis and characterization of nano ferrites, along with synthesis of graphene and polymer based ferrite composites. Her major interest is mainly focused on the characterization of the synthesized materials for several possible applications like magnetic, photocatalytic as well as dielectric. Her continuous efforts in the concerned field have created new possibilities for the multifunctional applications of organic nanoferrite composites.

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