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Gold Decorated Graphene for Rapid Dye Reduction and Efficient Electro Catalytic Oxidation of Ethanol R.S. SAI SIDDHARDHA, LAKSHMAN KUMAR V, Sri Sathya Sai Institute of Higher Learning, A. KANIYOOR, IITMadras, R. PODILA, Clemson University, V.S. MUTHU KUMAR, K. VENKATARAMANIAH, Sri Sathya Sai Institute of Higher Learning, S. RAMAPRABHU, IITMadras, A. RAO, Clemson University, S.S. RAMAMURTHY, Sri Sathya Sai Institute of Higher Learning, India, CLEMSON UNIVERSITY TEAM, SRI SATHYA SAI INSTITUTE OF HIGHER LEARNING TEAM, IITMADRAS TEAM — A well known disadvantage in fabrication of metal-graphene composite is the use of surfactants that strongly adsorb on the surface and reduce the performance of the catalyst. Here, we demonstrate a novel one pot synthesis of gold nanoparticles (AuNPs) by laser ablation of gold strip and simultaneous decoration of these on functionalized graphene derivatives. Not only the impregnation of AuNPs was linker free, but also the synthesis by itself was surfactant free. This resulted in *in-situ* decoration of pristine AuNPs on functionalized graphene derivatives. These materials were well characterized and tested for catalytic applications pertaining to dye reduction and electrooxidation. The catalytic reduction rates are 1.4 x 10^2 and 9.4x10^2 times faster for Rhodamine B and Methylene Blue dyes respectively, compared to earlier reports. The enhanced rate involves synergistic interplay of electronic relay between AuNPs and the dye, also charge transfer between the graphene system and dye. In addition, the onset potential for ethanol oxidation was found to be more negative $\sim$ 100 mV, an indication of its promising application in direct ethanol fuel cells.

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