Seminar Lectures

Speaker: Dr Srijita Basumallick

Assistant Professor

Department of Chemistry

Asutosh College

Date: 26th September, 2022

Topic: Bio-Fuel from Green House Gas CO_2

Mother Nature reduces CO_2 to bio-fuel glucose by photo-synthesis in green plants using sun light and bio-catalyst RuBP. This provides us an important lesson, here CO_2 reduction is an uphill reaction or thermodynamically unfavourable and difficult, in fact reduction of CO_2 to other simple fuels like methanol, ethanol, formaldehyde etc. are also thermodynamically unfavourable and kinetically difficult. The situation is overcome using solar energy (photoreduction of CO_2) or electrical energy (electro-reduction of CO_2). We use efficient photocatalysts and electro-catalysts for reduction of CO_2 to simple fuel. In this lecture we have summarized the different catalysts used in photo-reduction and electro-reduction of CO_2 their efficiencies and mechanism of action. Admittedly, in view of wide variety of catalysts reported in literature, we have reported here copper-based catalysts and their composites with graphene oxides. In this presentation, we shall discuss some synthetic methods of obtaining Cu-based nano

catalysts for CO_2 reduction including our recent work on water dispersible chitosan (CS)-copper-oxide (CuxO) nano composites of diameter 10-20 nm. These, nano composites were obtained by hydrothermal reactions of CS, $CuSO_4.5H_2O$ and tartaric acid (TA). Here, TA acts as a multifunctional reagent like de-polymerizer of CS, ionic cross linker of depolymerised CS and complex forming ligand with Cu^{2+} ions. These CS coated CuxO nano catalysts were characterized by HRTEM, UV-VIS, AFM, FTIR and XPS.