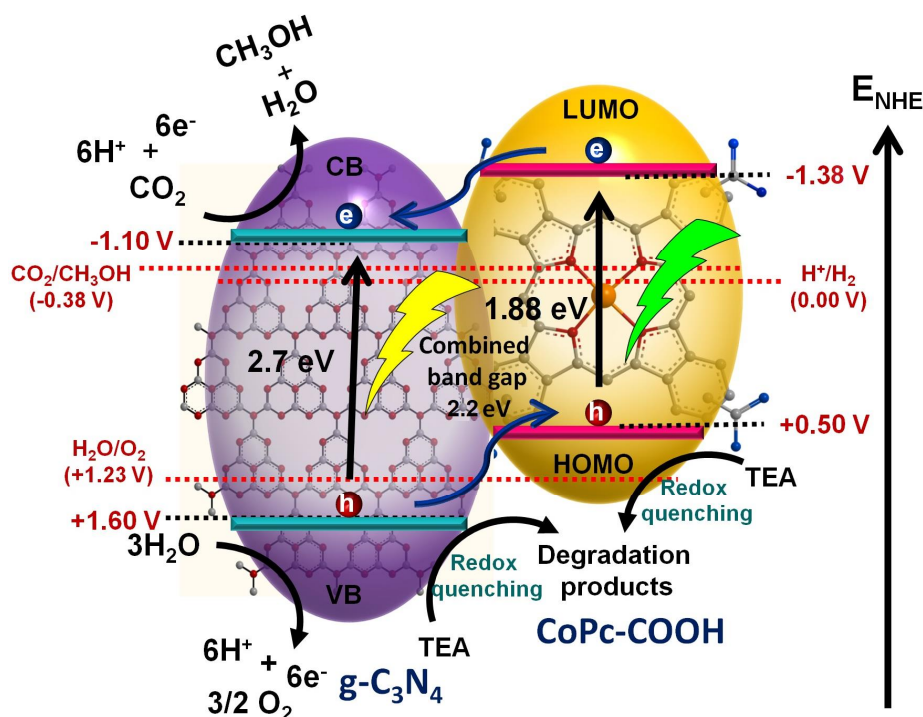


Utilization of CO₂ to Fuels and Chemicals



Although a great deal of innovation and development has been achieved during last two decades, on semiconductor type photocatalysts for water splitting and CO₂ photoreduction related applications, however, quantum efficiency of such systems are still far from acceptable values for practical exploitation. Recently metal complexes have been identified as very efficient photocatalysts and being explored intensely. Their homogeneous nature is one of the limitations and transforming those in to supported form will be a key to exploit their potential. This requires fundamental research on metal complex- support interactions, and same is proposed in this research proposal. This research area of immense futuristic importance is in infancy in India and deserves immediate attention to add to the ongoing R&D efforts related to solar energy utilization as a strategic energy related plans. In this regard, our group has done pioneering work in India related to metal complexes based photo-redox catalysts for the conversion of carbon dioxide to high value chemicals under visible light irradiation. The metal complex based photo-redox catalysts are targeted to be explored for their possible application in photoreduction of CO₂ to value added chemicals and fuels. Such a research will be important in point of view of both energy security as well as GHG emission control. More particularly, the group has developed a number of semiconductor-metal complex based hybrid photocatalytic systems for the photoreduction of carbon dioxide to methanol under visible irradiation.