



CHEMISTRY SEMINAR 291

Plasmon-assisted artificial photosynthesis

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ABSTRACT

In the near future, when we manage to wean ourselves off fossil fuels, we will also need to develop sustainable alternatives, preferably ultimately based on solar conversion, for the petrochemicals that currently provide us with our polymers and plastics, solvents, and pharmaceuticals, among our many other chemical necessities. At that point in time, solar electricity will likely have become a major component of our electrical supply, decreasing the price of electricity especially during daylight hours when supply outpaces demand. This, in turn may encourage the formation of industries that capitalize on cheap electricity to create valuable chemical products electrochemically, as a more valuable option to massive resources of passive storage. What if one could capitalize on solar energy in multiple ways, for example, by using solar-generated electricity to carry out electrochemistry while simultaneously illuminating the catalyst to further enhance its activity and/or direct the reaction towards desirable products. Several groups have showed over the past dozen years that a number of catalytic reactions can be accelerated when carried out on catalysts composed, for example, of copper, silver or palladium that can sustain surface plasmons when illuminated. The plasmons ultimately decay into energetic electrons and holes that can actively participate both directly in redox chemistry, or, as adjuvants that enhance the catalytic efficacy of these metals. The presentation will discuss the prospects of such plasmon-mediated photochemistry.