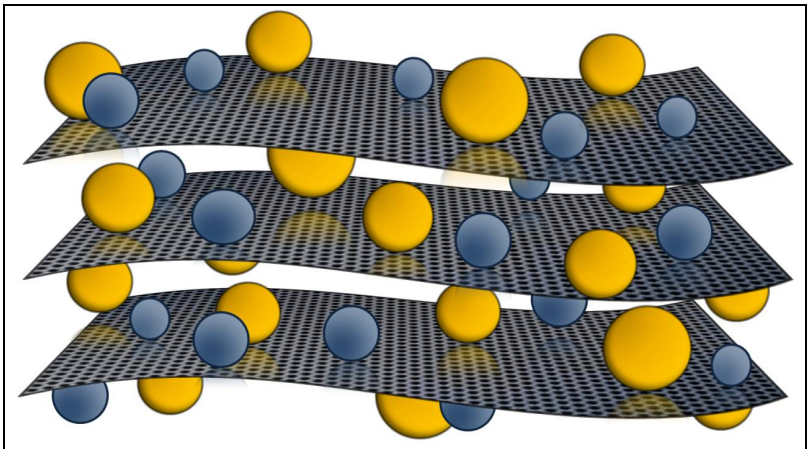
Anchoring Semiconductor and Metal Nanoparticles on a 2-Dimensional Catalyst Mat. Storing and Shuttling Electrons with Reduced Graphene Oxide

Ian V. Lightcap, Thomas H. Kosel, Prashant V. Kamat

Radiation Laboratory, Departments of Chemistry & Biochemistry, Chemical & Biomolecular Engineering, and Electrical Engineering, University of Notre Dame

Using reduced graphene oxide (RGO) as a two-dimensional support, we have succeeded in selective anchoring of semiconductor and metal nanoparticles at separate sites. Photogenerated electrons from UV-irradiated TiO_2 are transported across RGO to reduce silver ions into silver nanoparticles at locations distinct from the TiO_2 anchored sites. The ability of RGO to store and shuttle electrons, as visualized via a stepwise electron transfer process, demonstrates its capability to serve as a catalyst nanomat and transfer electrons on demand to adsorbed species. These findings pave the way for the development of next generation catalyst systems and can spur advancements in graphene-base composites for chemical and biological sensors.



Reduced Graphene Oxide sheets with semiconductor and metal nanoparticles.