

Capture, Store and Discharge. Shuttling Photogenerated Electrons across TiO₂-Silver Interface

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Semiconductor-metal nanocomposites are effective in facilitating photocatalytic processes. The coupling of semiconductor and metal nanoparticles provides a unique pathway for the discharge of electrons. UV-irradiation of TiO₂ nanoparticles in the presence of Ag⁺ ions results in the quantitative reduction and deposition of silver particles on the TiO₂-silver nanocomposite surface. The plasmon peak blue-shifts from 438 nm to 420 nm as they become charged as a result of continued UV-irradiation. Under UV-irradiation, the charging and discharging of electrons attain a steady state. Only a fraction of these electrons get stored when UV-light is turned off. The electron storage is dependent on the attached amount of silver with maximum capacity. Implication of charging and discharging processes in photocatalysis and photoelectrochemistry will be discussed.