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Light-controlled plasmon switching using hybrid metal-semiconductor nanostructures[1] HARI PAUDEL, MICHAEL LEUENBERGER, University of Central Florida — We show a method for the dynamic control over the plasmon resonance frequencies in a hybrid metal-semiconductor nanoshell structure with silver core and TiO_2 coating. We temporarily change the dielectric function of TiO_2 using pump laser pulse operating at bandgap or above. This generates free electron-hole pairs in TiO_2that alter the dielectric environment for the silver core. The probed surface plasmon frequency lying below bandgap appears to be blue-shifted due to the altered dielectric environment. We calculate the magnitude of the plasmon resonance wavelength shift as a function of electron-hole pair density and obtain shifts up to 126 nm at wavelengths of around 460 nm. Using these results, we propose a model of a light-controlled surface plasmon polariton (SPP) switch.

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