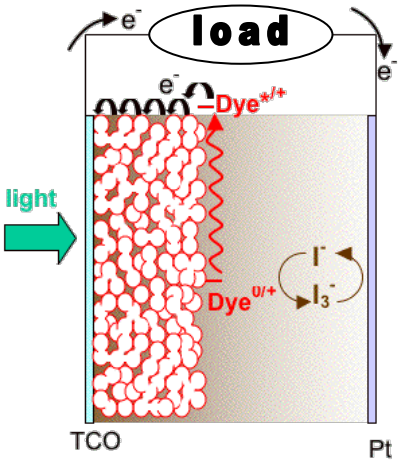
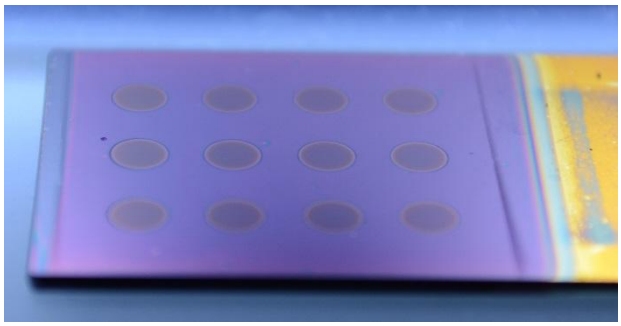
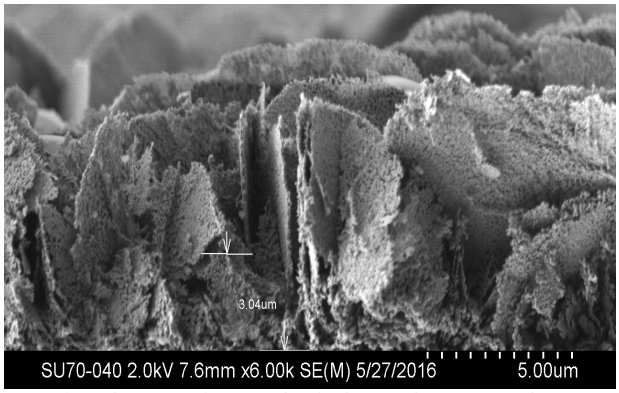


A dye-sensitized solar cell wherein an organic dye is chemisorbed on a matrix of 10-nm diameter semiconductor particles (typically ZnO or TiO_2 — see the SEM at right). When illuminated with sunlight, the dye absorbs a photon, creating an excited state from which an electron is injected into the conduction band of the underlying semiconductor. The electron migrates through the nanostructured semiconductor to the transparent front contact and into the external circuit. After performing work in the external circuit, electron returns to the cathode where it reduces I_3^- to I^-. The I^- in turn reduces the oxidized organic dye, closing the loop. The net effect is the conversion of sunlight into electrical energy with no chemical change within the cell.



An array of solid-state depleted heterojunction colloidal quantum dot solar cells with the structure ITO/CdS/PbS/Au. The lead sulfide colloidal quantum dot layer that gives the device its characteristic color is 200 nm thick.



Scanning electron micrograph of a layer of ZnO nanosheets electrodeposited on a surface of indium tin oxide conductive glass. Organic dyes can chemisorb onto these nanostructures (see description at left regarding dye-sensitized solar cells).