Quantum Size Effect on Surface Photovoltage Spectra: Alpha-Fe_2O_3 Nanocrystals on the Surface of Monodispersed Silica Microsphere

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wavelength for larger particles. However, we find the reflectivity produces reverse behavior in the Fe_2O_3/SiO_2 composites; the reflectivity of larger particles becomes smaller. This indicates that the absorption intensity of the composite in the 400−600 nm region is much larger than that in the 250−400 nm region, especially for those large-sized nanocrystals (in Figure 4a). Hence the absorption enhancement in the longer wavelength region for 48 nm nanocrystals reflects a photonic crystal effect because the intrinsically enhanced scattering for large particles was overcome by the photon l6Tizarpti.Fe

absorption spectra, all types of transitions contributed to the absorption coefficients (optical density), the local and delocalized (continuum) transitions all could show up in Figure 4. For SPV spectra, the situations are a little complicated, but only the continuous band and electronic transport contributes to the SPV responses. In principle, one nanocrystal cannot produce a steady photovoltaic response because there is no band-bending on the surface of nanocrystals due to limited space and the change of electronic distribution under light illumination, and because the photoinduced electron−hole cannot separate within a small distance for enough time to be detected by electrodes