The Effects of Applied Potential on Plasmon Resonance Bands of Nanoscopic Silver Particles Adsorbed on Transparent Electrodes. - N. Al-Rawashdeh and A. Al-Akhras (Jordan University of Science & Technology,)

The plasmon resonance spectra of nanoscopic silver particles of three different radii adsorbed on transparent semiconductor electrodes in contact with eight aqueous electrolytes (KCl, KBr, KI, NaCl, NaBr, NaI, $NaClO_4$, and KPF_6) in different concentrations have been examined. In all electrolytes, the plasmon resonance bands are red-shifted and decreased in intensity as the applied potential is made more positive. The degree of the potential-induced spectral changes depend on the electrolyte type and concentration, and the size of the Ag particles. The change in plasmon absorption band is largest for the smallest Ag particles. At constant particle size, the potential-induced spectral changes are largest in the presence of Cl^- and Br^- salts and smallest in the presence of KPF_6 and $NaClO_4$. Simulations using a Rayleigh limit coated sphere scattering theory suggest that the spectral red-shifting and intensity damping cannot be explained on the basis of free electron depletion and consequent reduction in the metal plasmon frequency. The largest effects for particles in contact with Cl^- and Br^- ions may arise from more severe reduction in electron mean free lifetime and/or the formation of a metal-adsorbate complex which is highly absorbing in the spectral region of the plasmon resonance band.