Tunable Optical Properties of Colloidal Quantum Dots in Electrolytic Environments

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The threshold of the absorption spectra of colloidal cadmium sulfide (CdS) quantum dots in electrolytic solutions is shown to shift as the concentration of the electrolyte is varied. The shift in the absorption threshold as a function of the electrolytic concentration is given by electrolytic screening of the field caused by the intrinsic spontaneous polarization of these würtzite quantum dots. These electrolyte-dependent absorption properties will be compared with Fermi-level tuning in carbon nanotubes in electrolytic environments. Moreover, concepts for integrating such colloidal quantum dots in high density networks with biomolecular links will be discussed.
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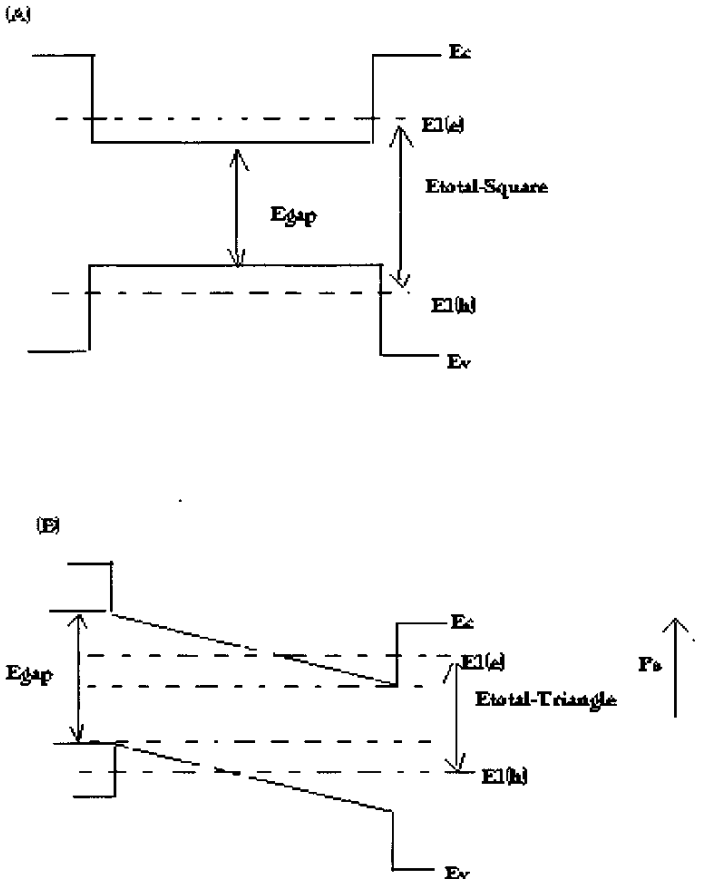

Figure 1: (A) Bandbending due to spontaneous polarization in the presence of electrolytic screening; (B) Bandbending due to spontaneous polarization with no electrolytic screening.