Supporting Information

For the formula $E_{gap} = E_{bulk} + \frac{h^2}{8R^2}\left(\frac{1}{m_e} + \frac{1}{m_h}\right) - \frac{1.8e^2}{\varepsilon R}$

E_{bulk} is the band gap of bulk materials (E_{CdSe}=1.84 eV, h is Plank constant, R means the radius of quantum dots, m_e is the effective mass of electron (for CdSe, m_e=0.13m_0, m_0=9.1*10^{-31} kg), m_h is the effective mass of hole (for CdSe, m_h=0.3m_0), ε is the semiconductor dielectric constant (for CdSe, ε=*9.56*), e=1.6*10^{-19} c.

Then we could get the relationship of E_{gap} with R. By solving the equation, R is 1.35 nm and the diameter is 2.7 nm.

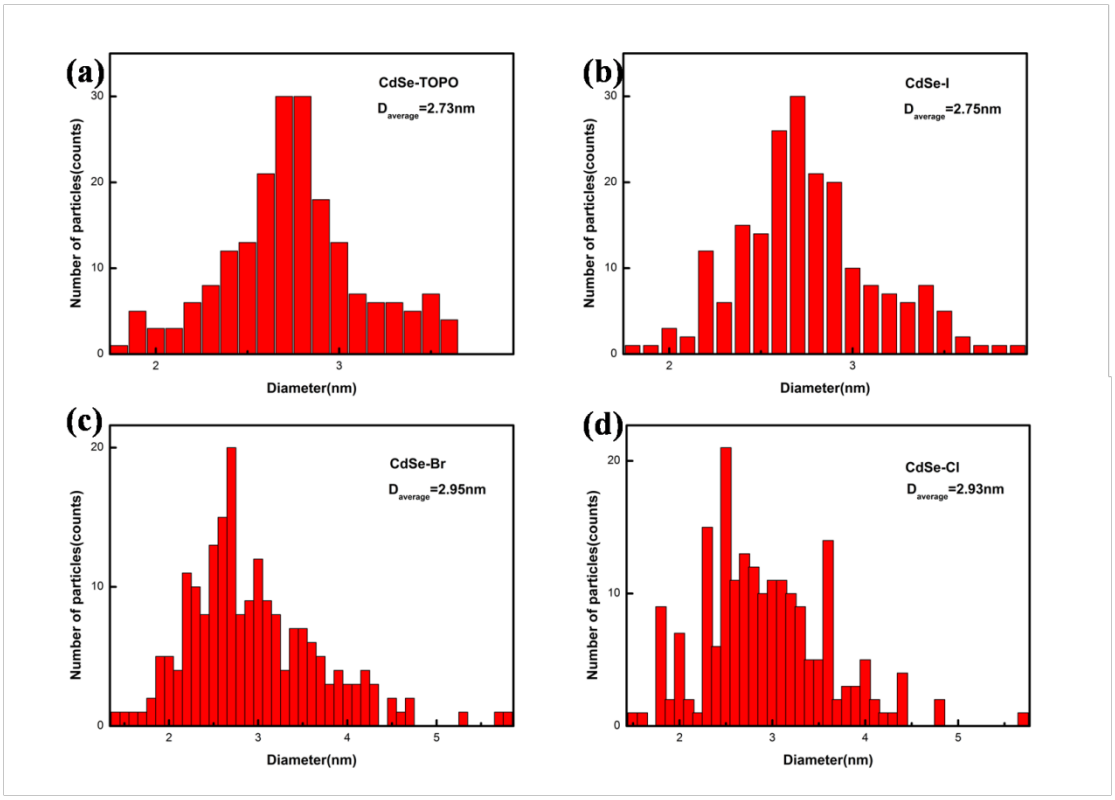


Fig S1 Size distribution histograms of CdSe QDs capped with different ligands: (a) TOPO ligands, (b) I^- ligands, (c) Br^- ligands, (d) Cl^- ligands.

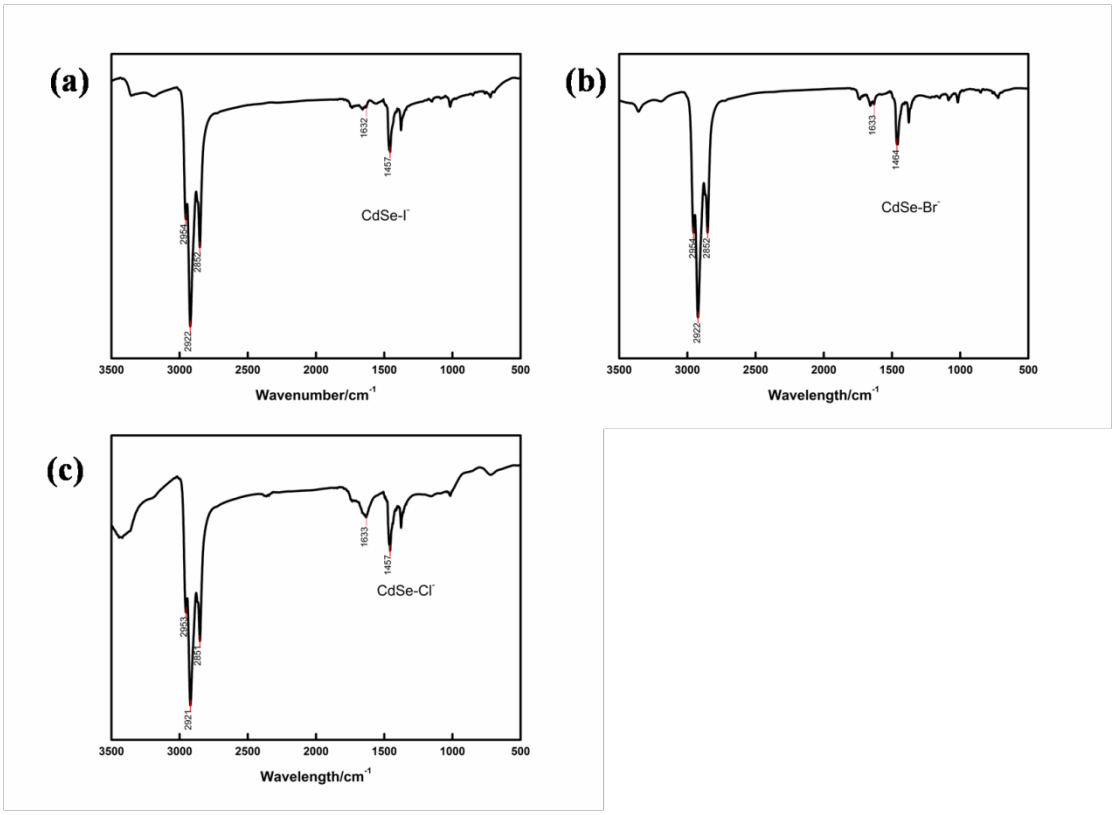
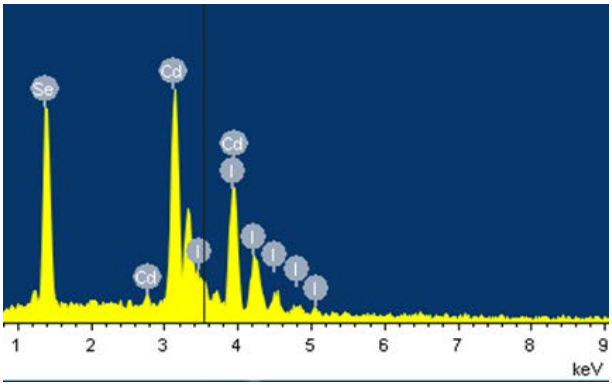
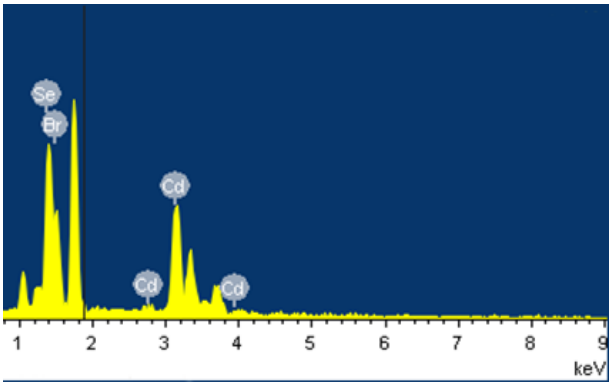


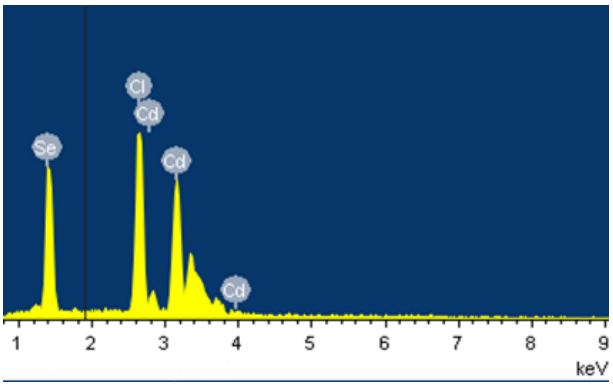
Fig S2 FTIR spectra of the upper clear liquor during ligand exchange: (a) I⁻ ligands, (b) Br⁻ ligands, (c) Cl⁻ ligands.



(a) CdSe QDs with I⁻ ligands



(b) CdSe QDs with Br^- ligands



(c) CdSe QDs with Cl^- ligands

Figure S3 EDX results of CdSe QDs with different halogen ion ligands.

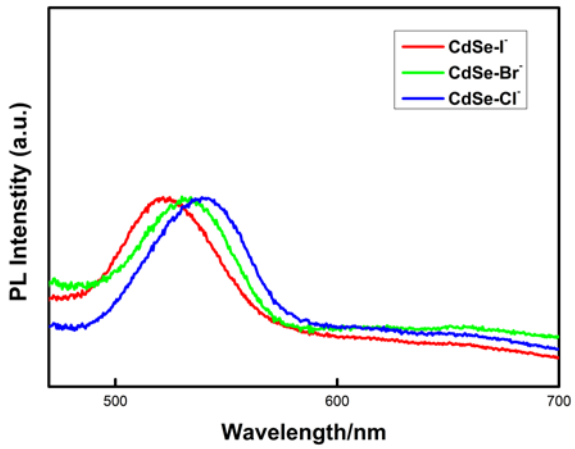
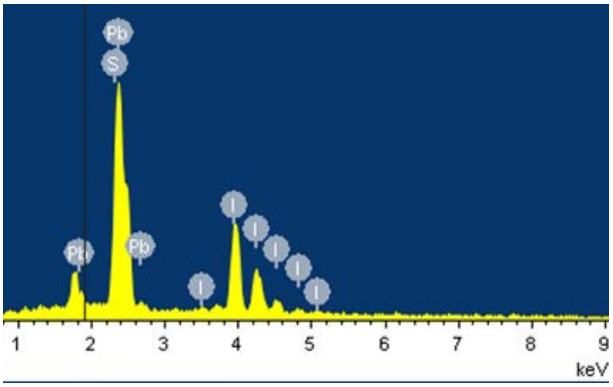
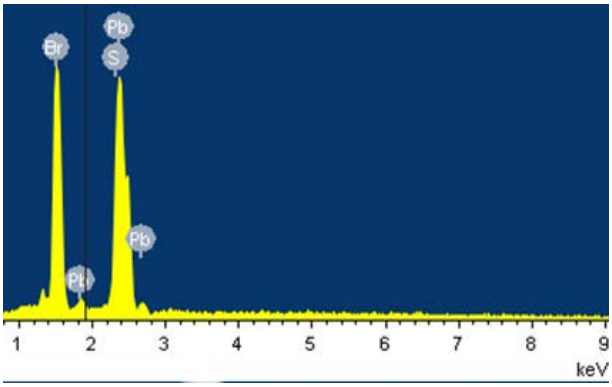


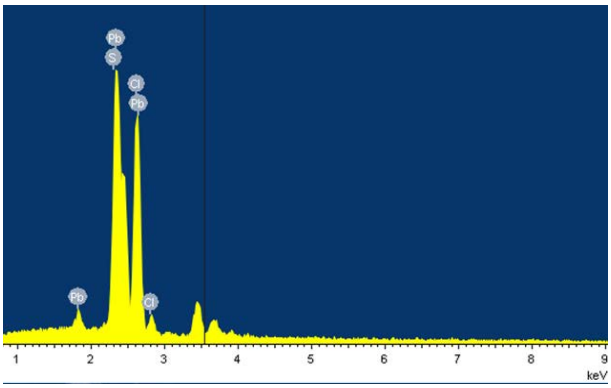
Figure S4 Photoluminence spectra of CdSe QDs with different inorganic ligands



(a) PbS QDs with I^- ligands



(b) PbS QDs with Br^- ligands



(c) PbS QDs with Cl^- ligands

Figure S5 EDX results of PbS QDs after ligand exchange

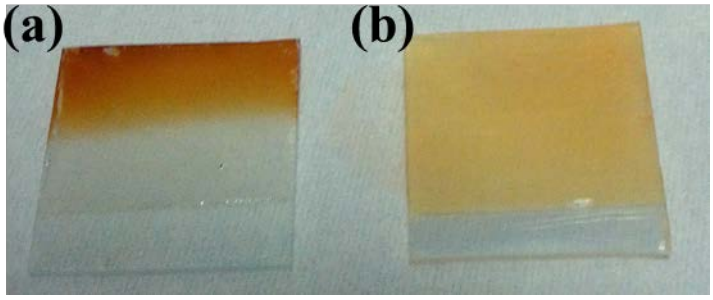


Figure S6 Photographs of TiO_2 films sensitized by CdSe QDs. (a) EPD method of I^- capped QDs; (b) Direct adsorption of TOPO capped QDs.