Title : Effect of Potassium Chloride on Optical Properties of Nickel Compound Quantum Dots Prepared via Electrochemical Process

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ABSTRACT

Nickel compound quantum dots (Ni compound QDs) are widely applied in many applications and can be used as a precursor for nickel oxide preparation. In this work, the effect of potassium chloride concentrations is investigated for nickel compounds quantum dots preparation by using an electrochemical process. For the synthesis procedure, electrolytes are prepared by KCl concentrations at 0.1 M, 0.2 M, 0.3 M and 0.4 M which are control variables mixed with a fixed citric acid ($C_6H_8O_7$) concentration at 0.1 M.

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Then, an electric potential of 3 volts is applied for 40 minutes. The optical properties of Ni compound QDs are characterized by using ultraviolet visible spectroscopy (UV-vis), Photoluminescent spectroscopy (PL) and Dynamic light scattering (DLS). As the results, the as-synthesized Ni compound QDs solution clearly exhibits two layers of NiOOH (top layer) and $NiCl_2$ (bottom layer) which are confirmed by UV-Vis results. For bandgap of Ni compound QDs, the condition of KCl 0.1 M reveals the highest bandgap value for both the top and bottom Ni compound QDs. For PL results, the light emission in top layer shows the highest peak at KCl 0.2 M corresponding to that of NiOOH. Meanwhile, the lower layer shows the highest peak at KCl 0.4 M corresponding to that of $NiCl_2$. Besides, the hydrodynamic size of Ni compound QDs is in the order of hundreds of nanometers as confirmed by DLS results. Therefore, it can be concluded that the optical properties of Ni compound QDs are affected by KCl concentration, indicating their potential of Ni compound QDs for tunable optical properties which are useful for optoelectronic and perovskite solar cell applications.

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