101-009

AGGREGATION AND GROWTH OF ZNO QUANTUM DOTS PREPARED FROM SOL-GEL CHEMISTRY

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Herein we discuss in depth the mechanisms of growth control of ZnO quantum dots (Q-dot) prepared from the zinc oxy-acetate ethanolic solution by the addition of LiOH. Through in situ monitoring of Q-dot radii and of aggregation index calculated from UV-Vis absorption spectra and small-angle X-ray scattering (SAXS) the aggregation and growth of ZnO nanocrystal was well described from two kinetic models: during the first step (t< 50 min) the structural evolution is controlled by the coalescence caused by the oriented attachment between the nanocrystal aggregates while at the advanced time (t> 50 min) the Q-dot coarsening follows the Ostwald ripening (OR) mechanism. From the higher oriented attachment efficiency observed here as compared with early reported synthesis using NaOH and KOH, we propose an universal mechanism to control coalescence and coarsening of ZnO nanocrystal provided from the shield caused by the adsorption ofthe alkali cation. From X-ray diffraction and transmission electron microscopy results we demonstrate that this mechanism is also useful to prepare Q-dot powders with controlled size