

A Method For Synthesising Defect Rich Nanocrystals Of Variable Size With Enhanced Defect Luminescence

Abstract:

A method to synthesize luminescent and variable size zinc oxide quantum dots from defect rich seeds makes use of both thermodynamic and kinetic principle to enhance the defect density in nanocrystals. The defect rich smaller nanocrystals are synthesized by rapid crystallization of nanocrystals above its crystallization temperature. Ultrafast dielectric heating by microwave initiates rapid crystallization. The defect rich smaller nanocrystals are further used as seeds for the growth of other different size nanocrystals with high defect density. The present invention also uses ZnO quantum dots (QDs) for thermodynamic promotion of defects in seed QDs and defect propagation in variable size ZnO QDs grown from defect rich seed QDs. The photoluminescence confirm that QDs grown from defect rich seed shows enhanced defect emission in comparison with the QDs grown from less defective seed. All the different size QDs synthesized is highly luminescent, stable, monodispersed in size and possess size tunable emission.

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