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Effect of Cr³⁺ doping on structural, electronic and optical property of ZnGa₂O₄ for bio imaging application

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Abstract: This paper reports the material properties of undoped and Cr³⁺ -doped zinc gallate (ZnGa₂O₄) nanopowder synthesized by citric acid assisted sol-gel method doped with chromium of different molar concentrations (0.005– 0.025%). The XRD patterns revealed that all the nano powders synthesized are cubic structured and Cr-doping did not affect the structure at all. The SEM micrographs show that nano powders are nearly spherical but became agglomerate with high doping of chromium concentrations. EDS measurement confirm the presence of the Zn, Ga, O and Cr ions. Undoped ZnGa₂O₄ nanopowder display a broad blue emission but doping Cr ions caused the emission to occur in the near infrared region. An increase in Cr ions leads significantly enhancement in the NIR emission. The PL emission wavelength was also observed to dependent on the excitation wavelength and these nanomaterials can effectively be used for bio imaging application [1]. The TL intensity was recorded for different UV irradiation and it display a single broad glow curve while the glow the intensity is seen to increase with increasing UV expose time. The effect of different heating rates was also studied and is seen to cause peak temperature shifts. Repeated measurements on the same sample seem not to have any effect on peak temperature positions and TL intensity indicating the sample was stable.

Reference: [1] K. J. Lee, MSc thesis, Texas A&M University, 2005

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yes

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PHD

Main supervisor (name and email) and his / her institution

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yes

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