Paper No: PU-SOE- Physics - 05

Effect of type of fuel used and calcination temperature on the disorder-order transformation of zinc aluminate spinel during combustion synthesis

Srinivas Reddy, G and Sharma, H and Bhaskar, P and Manjunatha

Abstract

Order-disorder transition for zinc aluminate samples synthesized via auto combustion synthesis method using different fuels (Citric acid, Glycine and Urea) were determined. The synthesized powders with various fuels are showing abnormal X-ray diffraction intensities, specifically in (331) and (400) reflections are too sensitive because of a significant amount of cations (Zn2+-tetrahedral site and Al3+- octahedral site) displaced from their ideal positions. With increase in calcination temperatures disorder to order transformation achieved through the diffusion of cations into the respective tetra and octahedral sites. Complete ordered structure attained at 750 Â°C for the sample synthesized with citric acid. However, powders synthesized with glycine requires high calcination temperature (1000 Â°C) due to the diffusion of the metal cations is severely impeded in powders of foam morphology. XRD and Raman results are corroborate with each other. Further, the UVV is and Photoluminescence studies for a sample with glycine as fuel is studied which shows the variation in band gap and narrowing of the emission band respectively.

Keywords:

Amino acids; Calcination; Citric acid; Energy gap; Fuels; Positive ions; Powder metals; Sodium Aluminate; Urea; Zinc compounds, Auto-combustion synthesis; Calcination temperature; Octahedral sites; Order transformation; Ordered structures; Synthesized powder; Tetrahedral sites; Zinc aluminate spinel, Combustion synthesis

Publication Details:

Journal Name	Vol.	Month & Year	Page No.	Publisher	Scimago Ranking
Materials Chemistry and Physics	253	Oct, 2020	123–388	Elsevier	Q2