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Study of chemically synthesized rare-earth terbium substituted bam hex ferrites

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The current study focuses on Barium based rare-earth terbium (Tb^{3+}) substituted M-type hexagonal ferrite materials with nominal composition BaTbxFe12-xO19 (x=0.00, 0.10, 0.20, 0.30) synthesized using Sol-gel auto-combustion technique. The rare-earth terbium (Tb^{3+}) element has been substituted at Fe^{3+} site to investigate its effect on chemical, electrical and magnetic characteristics of M-type hexagonal ferrite. All the prepared samples were sintered at temperature 1000°C as estimated from the DSC-TGA analyses to obtain the single phase ferrite component. The labeled peaks appeared in different EDX spectra confirm the presence of Ba, Tb and Fe elements in the synthesized compounds. The concentration of (Tb^{3+}) increases, while that of Fe^{3+} decreases, which shows the replacement of rare-earth terbium (Tb^{3+}) ions with that of Fe^{3+} ions. XRD analysis confirms the successful formation of single phase rare-earth terbium (Tb^{3+}) substituted ferrite materials. This crystallite range was set up to fall near the value of 65.15-37.35 nm, which is suitable to achieve the best signal of noise for recording components. Scanning Electron Microscopy laboratory analysis exhibits the geometry of grains in hexagonal shape. X-ray density improves from 8.084-8.359 g/cm^3 and the bulk density enhances from 5.78-5.93 g/cm^3.

Biography

Muhammad Imran Asghar has worked as a Process Engineer in sugar and glucose production units. He is presently working as a Senior Instructor at Chemical Technology Department in Government College of Technology Kamalia, Pakistan.

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