Structural properties dependence on annealing temperature of 1-D lanthanum iron garnet nanofiber prepared via electrospinning technique

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ABSTRACT
The effect of anealing temperature on structural properties of Lanthanum Iron Garnet (LIG) nanofiber has been studied. The LIG nanofiber were prepared by electrospinning technique. This technique has been extensively developed as a simple and efficient method for drawing nanofibers from polymer solutions. The viscous LIG solution were loaded in syringe and were pumped at 0.05 mL/h. The nanofibers were collected on aluminium foil and were treated at 700 °C, 750 °C and 1000 °C in order to study the effect of annealing temperature to the nanofibers structure. X-Ray Diffraction (XRD) and Field Emission Scanning Electron Microscope (FESEM) were employed to study the phase formation and morphology of the samples. The XRD results of LIG nanofiber reveals that as the annealing temperature increases from 700 °C to 1000 °C, the corresponding peaks become sharper and narrower, which demonstrate the improvement of crystallinity and crystallite size. The FESEM images of LIG nanofiber demonstrates that the nanofibers treated at 700 °C have continuous structure with a relatively rough surface and their diameter range is within 41.3 nm and 58.7 nm. Subsequently, when the calcination temperature increase further, the morphology of the sample is dramatically changed. As calcinations temperature rises to 750 °C, the surface of resultant nanofibers start to become agglomerate due to the growth and coalescence of the particle in the nanofibers under the calcination process and the nanofibers structure change back to continuous structure with bigger diameter at 1000 °C as compared to calcination temperature of 700 °C.

KEYWORDS
Electrospinning; Lanthanum iron garnet; Nanofiber

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