

TITLE

Preparation and characterisation of erbium doped tio2 nanofibers using electrospinning technique for thermophotovoltaic applications

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In recent years, much attention has been paid to the preparation and characterization of one-dimensional (1D) nanomaterials because of their unique physical and chemical properties. Many unique and fascinating properties have been proposed and demonstrated for this class of materials, such as metal insulator transition, superior mechanic toughness, higher luminescent efficiency, enhancement of thermoelectric figure of merit and lowered threshold. Er-doped titania nanofibers have been fabricated by electrospinning technique. The Electro spinning apparatus was operated at 20kV. In order to create erbia-containing titania nanofibers, erbium (III) oxide particles were added to the pre-cursor solution before electrospinning. A systematic microstructural and spectroscopic characterisation of Er-doped TiO₂ nanofibers is presented by means of scanning electron microscopy (SEM), Xray diffraction (XRD), Raman spectroscopy and Fourier Transform IR Spectroscopy (FT-IR). Optical properties were investigated by means of luminescence spectroscopy. All electrospun materials consisted of randomly oriented nanofibers. The average fiber size was 40–79 nm for Er-doped TiO₂ calcined at 500°C. The presence of RE elements shifted toward higher values the anatase to rutile phase transition temperature. The Raman spectroscopy analysis revealed the typical anatase phase vibrational modes at 500°C and the rutile phase ones at 1000 °C, accordingly to the XRD phase evaluations. Temperature-dependent near-infrared emission spectra demonstrate that the erbia-containing nanofibers emit selectively in the range 6000–7000 cm⁻¹. Because of their large surface to volume ratios and narrow-band optical emission, these nanofibers can be used as selective emitters for thermophotovoltaic applications.

Biography

R.Kokila is pursuing her M.Tech in Laser and Electro-Optical Engineering at Anna university, Chennai, India. She has also completed her B.E in Electronics and Communication Engineering at Paavai Engineering College, Tamil Nadu ,India.