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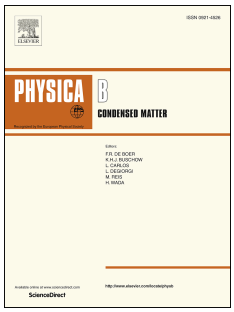

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Trap characterization by photo-transferred thermoluminescence in MgO nanoparticles

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Abstract

Shallow trapping centers in MgO nanoparticles were characterized using photo-transferred thermoluminescence (TL) measurements. Experiments were carried out in low temperature range of 10-280 K with constant heating rate. Shallow traps were filled with charge carriers firstly by irradiating the sample at room temperature using S^{90}/Y^{90} source and then illuminating at 10 K using blue LED. TL glow curve exhibited one peak around 150 K. Curve fitting analyses showed that this peak is composed by individual peaks with maximum temperatures of 149.0 and 155.3 K. The activation energies of corresponding trapping centers were revealed as 0.70 and 0.91 eV. The dominant mechanism for TL process was found as second order kinetics which represent that fast retrapping is effective transitions taking place within the band gap. Structural characterization of MgO nanoparticles were investigated using x-ray diffraction, scanning electron microscopy and Fourier transform infrared spectroscopy measurements. Analyses of experimental observations indicated that MgO nanoparticles show good crystallinity with particle size in nanometer scale.

Keywords: MgO, Thermoluminescence, Shallow traps

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