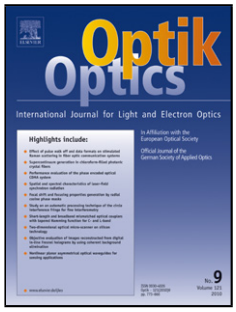

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Effect of laser energy on the properties of nanostructured lead iodide film prepared via pulsed laser deposition technique

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Abstract

The effect of laser energy density on the optical, structural and electrical properties of lead iodide PbI_2 film prepared by laser deposition technique was studied. X-ray diffraction XRD results revealed that the PbI_2 films deposited at laser energy density smaller than 3.5J/cm^2 are polycrystalline in nature with preferred orientation along (001) plane, while the film deposited at 3.5J/cm^2 was amorphous. The thickness and deposition rate of the film was found to be increased with laser energy density. The optical energy gap of PbI_2 film was in the range of (2.5-2.65) eV. SEM investigations showed that the deposited films are dense and have a homogeneous structure and the average grain size increases from 25 to 55nm as laser energy density increases from 2 to 3.5 J/cm^2. The film surface composed of aggregated grains and particulates. Energy dispersive x-ray illustrated the film deposited at 2J/cm^2 was stoichiometric and the films deposited at laser energy density >2 J/cm^2 were off-stoichiometric. The electrical properties revealed that the deposited films were p-type and the electrical resistivity decreases from 9.2×10^4 to 1.49×10^4 Ω.cm when laser energy density increases from 2 to 3J/cm^2.The hole mobility of the film was found to increase with laser energy