

عنوان مقاله:

Saturable absorption and self-focusing properties of Molybdenum Diselenide thin films

محل انتشار:

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خلاصه مقاله:

The next generation of photonics and nano-optical devices may be based on two-dimensional (2D) transition metal dichalcogenides (TMDs). In this research, molybdenum diselenide (MoSe_2) nanosheets, as one important member of TMDs, have been synthesized by the solvothermal method and characterized through XRD patterns, SEM, and TEM images. Nanosheets were found to have a hexagonal phase based on XRD patterns and the crystallinity percentage is ۲۴.۸ %. The lattice constants of the hexagonal phase of MoSe_2 are calculated as $a = 3.08 \text{ \AA}$, $c = 13.72 \text{ \AA}$. The calculated average value of the crystallite size, dislocation density, and micro strain are 21.935 nm , 2.138 nm^{-2} and 9.070×10^{-4} , respectively. A few layers of nanosheets without wrinkles were observed on TEM and SEM. Next, the synthesized nanosheets were employed to prepare thin films with three different thicknesses using the spin coating method. By employing a continuous wave (CW) Nd : YAG laser at 532 nm via a Z-scan approach, this study investigates how thin film thickness affects the thermal nonlinear optical (NLO) responses of MoSe_2 nanosheets. The magnitude of NLO coefficients of the prepared thin films decreased with increasing film thickness. It is observed that the prepared thin films possess saturable absorption (SA) as well as the self-focusing effect. Saturable absorbers and mode-locking devices can be developed with MoSe_2 thin films because of their improved NLO properties.

کلمات کلیدی:

MoSe_2 , Nonlinear optics, Saturable Absorption, Self-focusing, Thin Film]

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