Super-Resolved Laser Inscriptions Using Bi2Se3 Thin Films

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Abstract

Atomically thin chalcogenide films are promising 2D materials (topological insulators) with narrow band gaps. The previous investigations of our group demonstrate the impressive third-order optical nonlinearities associated with such materials (1). In this study, we focus on achieving sub-wavelength focal beam sizes for super-resolved nano-structuring by exploiting the giant saturable absorption of Bi2Se3 thin films. The Chalcogenide films were fabricated through e-beam deposition, and the optical nonlinearities associated with the films were studied using Z-Scan Technique. A significant nonlinear saturable absorption has been observed of the order of 10ˆ-7 m/W. A versatile and cost-effective tool for super-resolved direct laser structuring has been proposed in this study by utilizing chalcogenide thin films.

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