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ZnO Thin Film Samples Produced by Pulsed Laser Deposition for Ultrafast Laser High Harmonics Generation Studies

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The ultrafast laser generated high harmonics is currently a hot research topics. Higher order harmonics generation in a 0.5 mm thick ZnO bulk crystal irradiated by ultrashort pulses from mid IR laser has been reported recently [1]. Because of the long interaction length in the bulk media the effects from self phase modulation become significant and the consequences are deformation of the temporal profile and filamentation. Therefore, in these applications it would be advantageous to use thin film targets. High quality ZnO thin films can be produced using Pulsed Laser Deposition (PLD) [2] and can be optimized for a specific application by varying the deposition parameters. We have carried out a study to produce ZnO thin films with different crystalline characteristics as samples for ultrafast laser generated high harmonics studies. All the ZnO thin films were deposited on sapphire substrates by ablating a ZnO target (99.9 % pure) to produce a ZnO laser plasma with a Krypton Fluoride laser (248 nm, 15 ns) in partial oxygen pressure inside a vacuum chamber. The characterizations of the ZnO laser plasma and thin film samples are carried out using various techniques.

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