P.33 Nanostructuring thin polymer films with 2 and 3-beam single pulse laser interference lithography

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Laser ablation is one of the most used approaches to fabricate micro and nanostructures. Nevertheless, writing more than one of these features at a time requires the use of a mask. Laser Interference Lithography (LIL) allows overcoming this limitation and writing a whole array of structures at once.[1] The application of these patterning technique to polymer thin films has been scarcely reported in the literature,[2] and the use of 3-beam LIL in polymeric materials has not been reported to our knowledge. In this work, 2 and 3-beam Single Pulse Laser Interference Lithography has been applied to thin polymer films obtaining micro and nanogratings as well as nanocavities arranged in a distorted hexagonal lattice. The formation mechanism of ablation in polymer thin films has been studied by inspecting different regions of the sample corresponding to different laser fluences. The assessment of the resulting structures has been carried out in real (AFM) and reciprocal (GISAXS) space, showing the solid structural order of the samples and the well defined morphology of the structures.

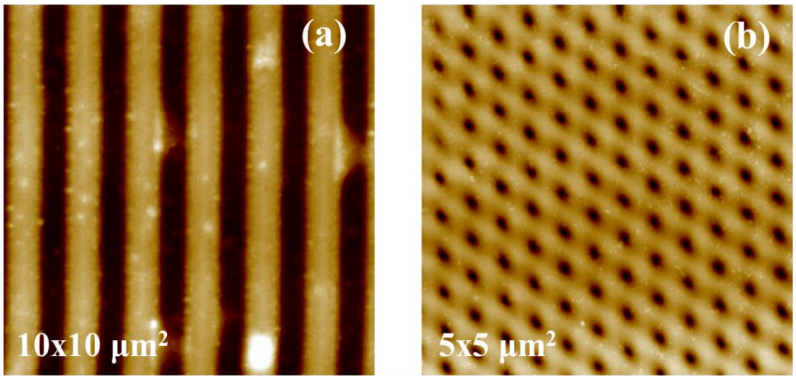

Figure 1. AFM topography maps of structures fabricated in thin polymer films by LIL: (a) micrograting fabricated by 2-beam LIL and (b) nanocavities fabricated by 3-beam LIL.

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[2] Lasagni, A. F.; Hendricks, J. L.; Shaw, C. M.; Yuan, D.; Martin, D. C.; Das, S. *Applied Surface Science* 2009, 255, 9186-9192