

Title: Sub-micron structuring of silicon using femtosecond laser interferometry

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Abstract: We report the fabrication of planar sub-micron gratings in silicon with a period of 720 nm using a modified Michelson interferometer and femtosecond laser radiation. The gratings consist of alternated stripes of laser ablated and unmodified material. Ablated stripes are bordered by parallel ridges which protrude above the unmodified material. In the regions where ridges are formed, the laser radiation intensity is not sufficient to cause ablation. Nevertheless, melting and a significant temperature increase are expected, and ridges may be formed due to expansion of silicon during resolidification or silicon oxidation. These conclusions are consistent with the evolution of the stripes morphology as a function of the distance from the center of the grating. (C) 2013 Elsevier Ltd. All rights reserved.

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