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**Compaction of polydimethylsiloxane due to nitrogen ion irradiation and its application
for creating microlens arrays**

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Abstract

In this work the change in the surface topography of polydimethylsiloxane (PDMS) due to irradiation with 10.5 MeV N⁴⁺ ion microbeam is investigated. Parallel stripes with different widths and different gaps between the stripes were irradiated. The heavy ion beam induced physical and chemical processes caused shrinkage of the irradiated structures. The degree of compaction, and its relation to the irradiation fluence and pattern was studied by means of atomic force microscopy (AFM). Exploiting the compaction effect, arrays of microlenses with different diameters were designed and fabricated in PDMS. We show that regular microlenses can be produced by the adjustment of their size and irradiation fluence. The focal length of the lenses can be tuned with the diameter of the lens and with the delivered ion fluence.

Keywords: ion microbeam, microprobe, polydimethylsiloxane, microlens

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