

Direct Electron Beam Patterning of Diffractive Structures in PEPC-SY3 Azopolymer Films

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Abstract: Azopolymers are well known for their ability to record holographic gratings due to photoinduced molecular reorientation and mass transport processes occurring under polarized light irradiation. In particular, the azopolymer PEPC-SY3 exhibits pronounced photoinduced anisotropy, which enables efficient recording of polarization-dependent holographic structures. These unique properties make azopolymers promising materials for the fabrication of diffractive optical elements and polarization-sensitive photonic structures.

In this work, diffraction gratings were fabricated on thin films of the PEPC-SY3 azopolymer using electron beam lithography (EBL), which enables precise control over the geometry and periodicity of the patterned structures. The use of EBL allows direct writing with nanoscale resolution and provides an alternative approach to conventional optical holographic recording techniques. It was shown that the step size is a critical parameter in the EBL recording process, as it directly determines the effective exposure time at each point of the patterned structure.

The obtained results demonstrate that the PEPC-SY3 azopolymer can be effectively structured using EBL, highlighting its potential for the fabrication of high-resolution diffractive elements and integrated photonic components.

Keywords: Azopolymer, Thin films, Electron beam lithography, Diffraction gratings, Photoinduced anisotropy