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Replication fidelity assessment of large area sub-μm structured polymer surfaces using scatterometry. - DTU Orbit (08/11/2017)

Replication fidelity assessment of large area sub-μm structured polymer surfaces using scatterometry.

The present study addresses one of the key challenges in the product quality control of transparent structured polymer substrates, the replication fidelity of sub-μm structures over a large area. Additionally the work contributes to the development of new techniques focused on in-line characterization of large nanostructured surfaces using scatterometry. In particular an approach to quantify the replication fidelity of high volume manufacturing processes such as polymer injection moulding is presented. Both periodic channels and semi-spherical structures were fabricated on nickel shims used for later injection moulding of Cyclic-olefin-copolymer (COC) substrate were the sub-μm features where ultimately transferred. The scatterometry system was validated using calibrated atomic force microscopy measurements and a model based on scalar diffraction theory employed to calculate the expected angular distribution of the reflected and the transmitted intensity for the nickel surfaces and structured COC and, respectively.

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