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# **Replication fidelity assessment of polymer large area sub- $\mu\text{m}$ structured surfaces using fast angular intensity distribution measurements.**

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**Key words:** nano structures replication; atomic force microscopy (AFM); angular intensity distribution

## **Abstract**

The present investigation addresses one of the key challenges in the product quality control of transparent polymer substrates, identified in the replication fidelity of sub- $\mu\text{m}$  structures over large area. Additionally the work contributes to the development of new techniques focused on in-line characterization of large nanostructured surfaces. In particular the aim of the present paper is to introduce initial development of a metrology approach to quantify the replication fidelity of produced 500 nm diameter semi-spheres via anodizing of aluminum (Al) and subsequent nickel electroforming to COC injection molded polymer parts. Calibrated AFM measurements were used to develop a model based on scalar diffraction theory able to calculate the expected nickel and COC substrates angular distribution of reflected and transmitted intensity respectively.