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Seamless Tool Fabrication for Roll-to-Roll-Microreplication

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Abstract

Roll-to-Roll microreplication combines the precision of hot embossing with continuous cost efficient replication on polymer films on large scale. For a viable realisation of this process, the main challenge for Roll-to-Roll hot embossing is the transfer from conventional flat silicon based micro structuring technology, to curved, large scale surfaces on continuously working rolls. This article presents lithography and electroplating based fabrication method of seamless microstructured sleeves and the Roll-to-Roll microreplication in a selection of high performance polymers like PEEK, LCP, PTFE, FEP, PSU and metal films Aluminum and Copper.

Keywords:
Roll-to-Roll, Micro replication, Large scale, Mold fabrication, Seamless, Thermal Nanoimprint

1. Introduction

Surface micro- and nanostructuring of polymer films enables advanced functionalities, new products, and improved performance for a wide range of applications. Well known examples are biomimetic surfaces like anti-reflective moth eye structures [1] or self-cleaning surfaces based on the Lotus effect [2]. Complete sectors e.g. of optoelectronics [3] and microfluidics [4, 5, 6] were arisen from functional surface structures which make the main effect of these devices.

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