A Study of Electrowetting-Assisted Mold Filling in Nanoimprint Lithography

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Abstract : Nanoimprint lithography (NIL) possesses the advantages of sub-10-nm feature and low cost. NIL patterns the resist with physical deformation using a mold, which can easily reproduce the required nano-scale pattern. However, the variation of process parameters and environmental conditions seriously affect reproduction quality. How to ensure the quality of imprinted pattern is essential for industry. In this study, the authors used the electrowetting technology to assist mold filling in the NIL process. A special mold structure was designed to cause electrowetting. During the imprinting process, when a voltage was applied between the mold and substrate, the hydrophilicity/hydrophobicity of the surface of the mold can be converted. Both simulation and experiment confirmed that the electrowetting technology can assist mold filling and avoid incomplete filling rate. The proposed method can also reduce the crack formation during the de-molding process. Therefore, electrowetting technology can improve the process quality of NIL.

Keywords : electrowetting, mold filling, nano-imprint, surface modification
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