

Hot-rolling Nanoimprint Process Simulation and Validation

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Abstract

Nanoimprint lithography is a novel method of fabricating nanometer scale patterns such as molds (cores) with micro/nano structures by mechanical deformation of imprint resist and subsequent processes. The imprint resist is typically a monomer or polymer formulation that is cured by heat or UV light during the imprinting. Adhesion between the resist and the template is controlled to allow proper release. Roll-to-roll technique used in production can be classified into three procedures: (1) Deposition, (2) patterning and (3) package. This study covers discussions on problems during the nano/micro structure forming process. They are then cross-examined with experimental finished products under optimized forming. Since this technique has multiple production advantages, it is expected that finite element computations for capacitance using ANSYS software be simulated to monitor PMMA during the imprint process conditions inside the mold cavity such as filling and material gravitational force changes. The simulation numerical values and process results analyzed by instruments in the experimental group are cross-examined to derive at solutions for parameter setting related problems such as scale error after imprint. Finally, all results are compiled and compared.

Keyword : Nanoimprint etching, hot-press forming, nanoimprint lithography.