

Lifetime Prolongation of Release Agent on Antireflection Structure Molds by Means of Partialfilling Ultraviolet Nanoimprint Lithography

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ABSTRACT

Release agent becomes an imperative element in ultraviolet nanoimprint lithography (UV-NIL) for preventing the adhesive resin from adhering to the surface of antireflection structures (ARS) mold. However, complete filling the resin of a high-aspect-ratio ARS mold during UV-NIL generates a strong release force (RF) that deteriorates the release agent and shortens the lifetime of the ARS mold. In this paper, we proposed a technique of partial-filling UV-NIL in order to reduce the RF and consequently, prolong the lifetime of the release agent on ARS mold. The release and optical properties of the ARS were measured to determine the lifetime of the release agent on the mold, and complete-filling UV-NIL was also executed for comparison. By means of partial-filling UV-NIL, we successfully fabricated ARS films with excellent performance up to 75th imprint compared to complete-filling UV-NIL up to the 40th imprint.

KEYWORDS: ultraviolet nanoimprint (NIL); lifetime; partial filling; release force; contact angle

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