Precision Transfer and Replication of Ultrasonic Nanoimprint

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Abstract

This study succeeds to replicate a micro-feature by ultrasonic nanoimprint. The conjunction effect of the pressure and the ultrasonic vibration enables flowing of plastic into a more precise micro-feature of the metal mold. The longitudinal wave generated by an ultrasonic system of the frequency 35KMz and output power 900W. The micro-feature of the Ni mold insert used in the experiment is a groove shape. The groove's width is 49 μm and its depth is 25 μm. The PMMA, PC and PP are chosen with the replication materials. This study also discusses the replication properties of plastic film by different processing parameters (delay pressure, fusion pressure, embossing pressure, delay time, fusion time and embossing time).