

## **Fabrication of the transparent cylindrical stamp with sub 50nm linewidth by means of the step & flash nanoimprint lithography**

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In nanoscale stamp fabrication, the overheads of time, cost and patterning area are soaring. Furthermore, the fabrication of cylindrical stamps is also rather difficult with some nanoscale patterns.

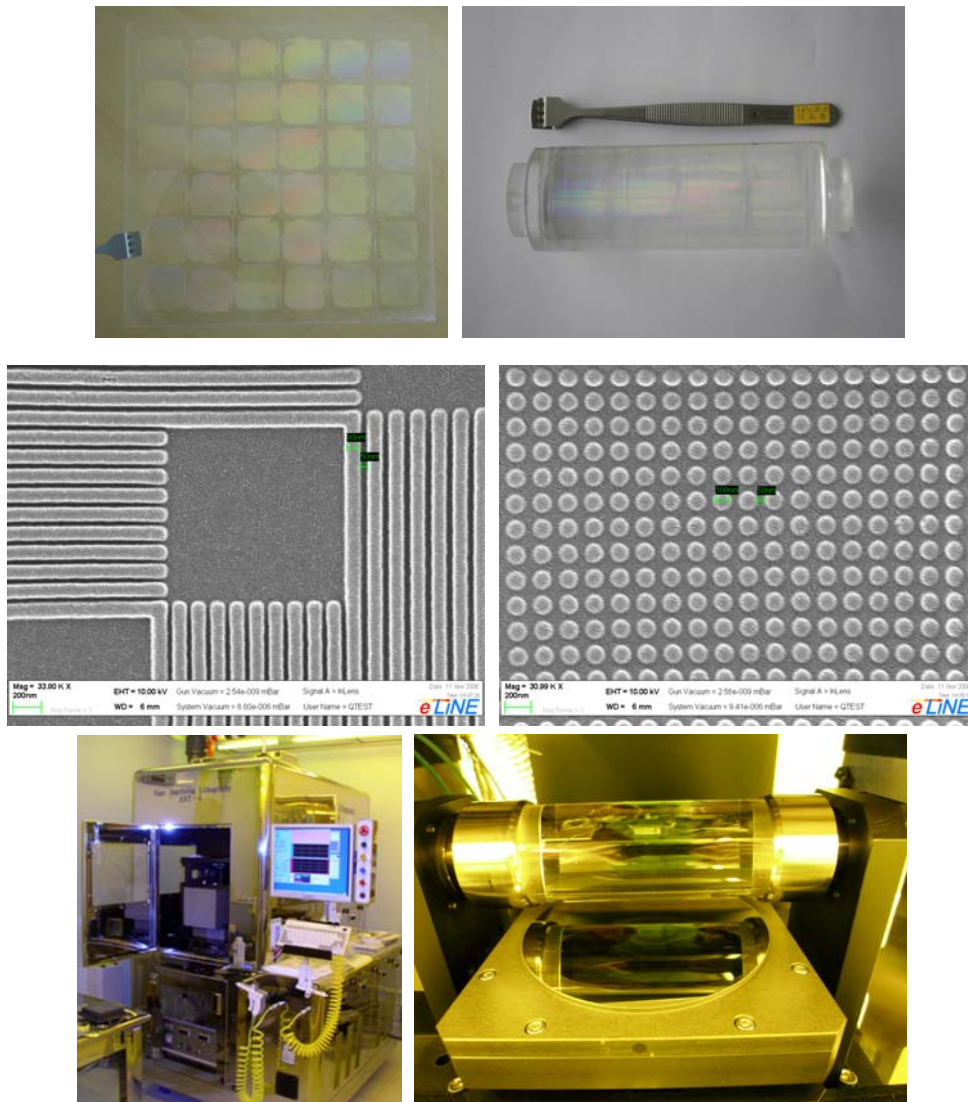
In this work, a process of fabricating a transparent cylindrical stamp is proposed. The transparent cylindrical stamp with sub 50nm linewidth is verified through the application of a roller-type ultraviolet-nanoimprint lithographical process on the ANT-6R which is developed by the Korea Institute of Machinery and Materials.

To fabricate the large area stamp, 1<sup>st</sup> generation stamp is replicated on the 150mm by 150mm polycarbonate film with the Ormostamp resist (Microresist Technology). The 1<sup>st</sup> generation stamp which is a 23mm by 23mm is a quartz stamp with about ~50nm lines and dots. Ormostamp is spin coated on the polycarbonate film, and the step & flash process is executed on the polycarbonate film and repeated totally 36 times. The anti-adhesion monolayer is coated on the large area Ormostamp replica (2<sup>nd</sup> generation stamp) surface. In order to fabricate the transparent cylindrical stamp (3<sup>rd</sup> generation stamp), the polyurethane acrylate resist (PUA, Minuta tech.) is spin coated on the 2<sup>nd</sup> generation stamp. The acrylate cylinder is about 100mm of length and 40mm of diameter.

To verify this transparent cylindrical stamp (2<sup>nd</sup> generation stamp), UV-NIL process is executed on the polycarbonate film with UV curable resist.

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*Fig. 1: The Transparent Cylindrical Stamp: to fabricate the cylindrical stamp (3<sup>rd</sup> generation stamp), the large area stamp which is fabricated by step & flash NIL process is used for pattern transfer to acryl cylinder without any pattern. Replicated pattern size on the Ormostamp is about ~50nm.*