# Soft UV-Nanoimprint Lithography

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The Soft UV-Nanoimprint Lithography (Soft UV-NIL) is a soft-lithographic process for nano-patterning on wafer scale in one imprint step only. The patterning itself is performed at room temperature at low imprint pressures below 1bar and can be used to pattern non-flat surfaces.
The commonly used soft-lithographic process of microcontact printing (μ-CP) [1,2] is best suited for printing functional monolayers used in a bottom up patterning approach, yet the technique seems less suited for nano-structuring of surfaces in a top down approach due to the poor etch resistivity or density of the formed monolayers. Here, an imprint process that uses a three dimensional resist mask for the subsequent RIE-plasma processes is the method of choice. The UV-NIL process [3,4], which has proven its applicability as a low cost competition for EUV-lithography, uses a small (usually 1inch) [5] glass stamp for the structure definition yet for patterning on wafer scale a step&repeat process [6] must be used due to the rigidity of the stamp.

The Soft UV-NIL process [7] merges the soft-lithographic approach with the well known UV-NIL-process. The processes main advantages are based on two features; the high transparency flexible stamp and the low viscosity UV-curable resist. In addition, permeability of the used elastomeric stamp material inhibits problems caused by trapped air bubbles in the resist layer when imprinting at ambient pressure is carried out. The process is mainly aimed at applications coming from the microfluidic, optics and medtech sectors. Here, especially sensory applications, where an increase in pattern size improves the functionality, and devices that are dependent on large continuous pattern without any stitching errors are addressed.

In this contribution data concerning stamp fabrication, resist, imprint conditions, resolution and area homogeneity will be given. Figure 1 shows an exemplary imprinted 6inch wafer. In Figure 2 SEM pictures evidence the achieved resolution in the sub-50nm regime. In addition, details on structure transfer for an exemplary functional device will be given.

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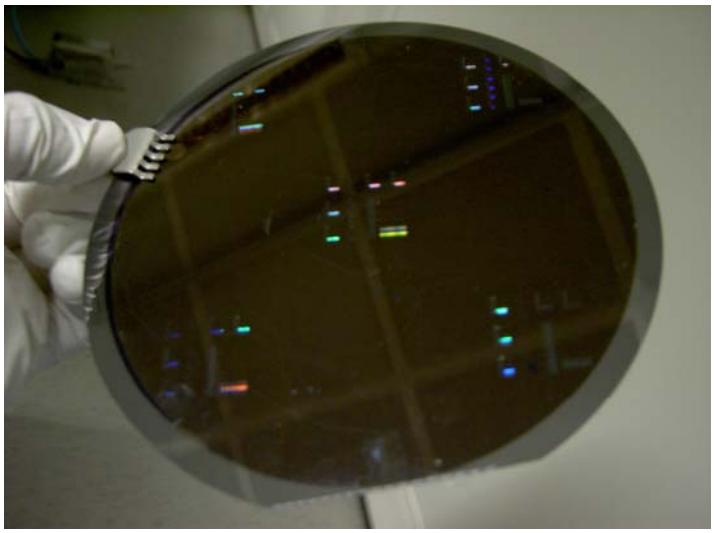

**Figure 1:** 6inch wafer imprinted with Soft UV-NIL process

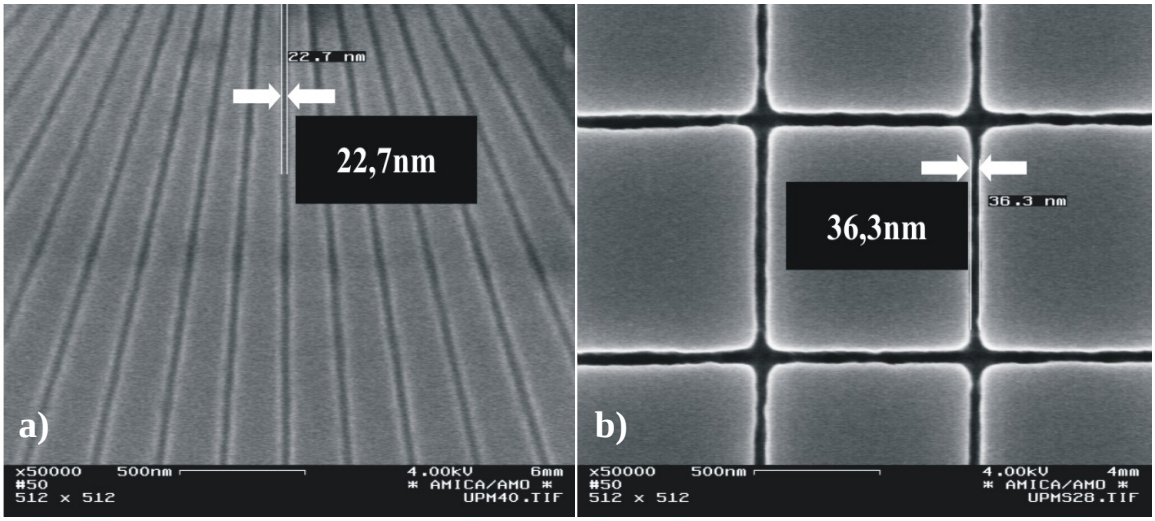


**Figure 2:** SEM pictures of imprinted high resolution features a) 22,7nm stellar like structure with converging lines and b) 36nm mesh structure