

Plasma Treatments Of NIL Polymers To Enhance Anti-Adhesion Properties

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The stamps used in nanoimprint lithography (NIL) need an anti-adhesive coating to optimize the replication process. These coatings are not as effective and long-lasting as needed, therefore an alternative is to modify the surface of the polymer film.

In order to optimize the anti-sticking properties of the surface of the polymer without modifying the nanoimprint process parameters, a plasma treatment has been developed. The result is a nanolayer of Teflon-like on the surface of the polymer.

Plasma processes under different MW and RF power, with different CF₄ and SF₆ gas flows have been tested on several allyl and acrylate polymers.

The chemical, morphological and nanostructural properties of these films have been analysed with AFM, XPS and its contact angle. The modified nanolayer is approximately 3nm deep, the roughness increase is lower than 6nm and the chemical groups introduced are CF₂ and CF₃.

The functionality of this method has been tested under standard NIL conditions on a standard NIL system and the lifetime of the treatment has been assessed to last longer than 1 month. The etching rate of the residual layer has also been checked and no modification has been observed.

Fig 1. XPS in depth profile of modified mrI 7030

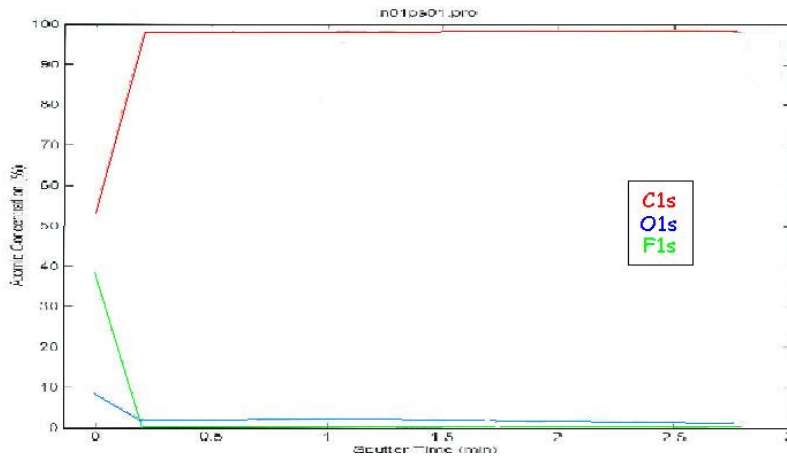


Fig 2. Imprinted plasma treated mrI 7030



Fig 3. Comparison of imprinted surfaces with and without modification

