

# Fabrication of micro and sub-micrometer wrinkled hydrogel surfaces through thermal and photocrosslinking processes

## Abstract

Micro-morphology control of films is fundamental to adapt a particular material for their final application. The strategy depicted in this study permits the spontaneous formation of corrugated patterns using a two-step procedure involving an initial thermal pre-polymerization followed by UV exposure. Two deposition methods, electrospray and spin coating were explored; interestingly, spin coating forms homogeneous topography that cover large areas of the substrate, permitting an ease control of the micro-structure. Equally, the wrinkle pattern was modulated through the variation of intrinsic material characteristics, in particular molecular weight of the crosslinking agent. The results obtained indicate that their increase produces the same effect in wrinkle amplitude and wavelength, and therefore, in their roughness. This behavior can be explained by the stiffness decrease according to the PEGDA molecular weight increase. As a result, an increase of available surface from  $\sim 14\%$  up to  $\sim 29\%$  was observed. Consequently, this versatile approach allows to modulate the surface pattern according to the application needed just by finely tuning the hydrogel composition.