PO1093

Plasma tailoring of polycarbonate to the desired SuperHydrophilic/SuperHydrophobic features

Fabio Palumbo[1], Rosa Di Mundo[2], Riccardo d'Agostino[3], Davide Cappelluti[4]

[1]CNR-IMIP, Bari, Italy [2]Dipartimento di Chimica Universita di Bari, Bari, Italy [3]Plasma Solution s.r.l., Bari, Italy [4]Dipartimento di chimica - Universita di Bari, bari, Italy

fabio.palumbo@cnr.it

The relevance of poly(bisphenol A carbonate), PC, in many optical applications pushes towards refining of its surface functional properties, from self-cleaning to anti-reflection. Although textured super-hydrophobic polymer surface are well known and investigated, poor attention has been devoted at super-hydrophilic surfaces. In this contribution the versatility of plasma processing is demonstrated for the preparation of nanotextured polycarbonate surfaces with superior wettability properties and variable hydrophobic-hydrophylic features.
In particular, we show the capability of oxygen plasma etching in tuning, as a function of plasma parameters, the texture features such as the average height (from few tens to several hundreds of nanometers) and density of relieves, and to chemically modify surfaces by grafting of oxygen containing groups. Such modifications sensitively affect material wetting performances, which move from moderately hydrophobic to highly hydrophilic. It is known from the available literature that the hydrophilic status of a polymer surface can be kept only for short time due to the spontaneous functional groups re-orientation, known as hydrophobic recovery. However a proper post deposition process allows for transparent and stable superhydrophylic surfaces. Therefore we describe our strategy towards stable wetting properties based on nano-sculpting PC surface with oxygen plasma and coating the resulting structures, in single batch experiments, with plasma films from organosilicon or fluorocarbon precursors. Tailoring of surface chemistry (precursor, oxygen dilution, power), from fluorocarbon or silicone-like to a silica-like coating, leads to slippery super-hydrophobic or super-hydrophilic surfaces with negligible aging. Further, the optical transmittance of the modified polycarbonate is preservation, and eventually improved.

Keywords
polycarbonate
plasma texturing
superhydrophobic
superhydrophilic