

Plasma-polymers interactions for nano and micro textures

C. Piferi,^{1*} M. Daghetta, R. Barni,¹ H.E.Roman¹ and C. Riccardi¹

¹*Dipartimento di Fisica, Università di Milano Bicocca,
Piazza della Scienza 3, 20126 Milano- Italy*

*corresponding author: c.piferi@campus.unimib.it

Nanostructured polymeric materials exhibit new advanced properties of adhesion, fouling and anti-fouling amenable to be used in various contexts: the biomedical, for the water repelling and self-cleaning materials, in nano-electronic and sensor devices. The development of nanostructured morphologies structures can be performed by plasma treatments with a variety of gas precursors. Recently by oxygen non-thermal plasmas surface morphologies have been performed having fractal behavior [1]. The processes responsible for nano structuring are most ascribable to the chemical etching promoted by atomic oxygen. However a fine tuning control of the micro and nanosized textures and the relationship with the macroscopic parameters need to be investigate in order to finalize the application field.

In this paper a study of the oxygen plasma processing has been performed in order to optimize the plasma parameters and the polymeric hydrophilicity properties.

The surface morphological parameters (wettability, roughness, statistical distribution of the nanostructures) of polymers are evaluated by varying the time exposure and the RF power of the non-thermal plasma produced in oxygen.

The surface analysis has been performed by means of microscopic and macroscopic analyses (AFM, SEM, water contact angle, roll-off angle).

[1] Piferi C., Bazaka K., D'Aversa D.L., Di Girolamo R., De Rosa C., Roman H.E., Riccardi C., and Levchenko I., *Advanced Materials Interfaces* **8**, (19) 2021, 2100724