

# Effect of operating conditions on the surface properties of plasma treated polycaprolatone surfaces

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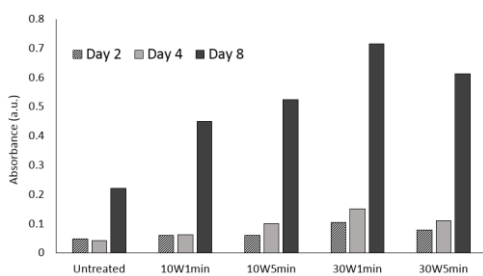
**1. Introduction** – Plasma treatment of polycaprolactone (PCL) surfaces has been widely used in the State of the Art to increase the hydrophilicity of this material and the surface concentration of bioactive functional groups and, as a consequence, to raise its cell affinity for Tissue Engineering applications [1, 2]. Despite of the spread of plasma treatment for the improvement of the biological performance of PCL based scaffolds, there is a lack of information about how power and time exposure affect the cell affinity of the samples. This contribution consists of a preliminary analysis of such an evaluation and it is part of the project BioAM-DPI2017-88465-R funded by the Science, Innovation and Universities Spanish Ministry.

**2. Experimental** – 8 mm discs of PCL were subjected to plasma treatment at 10 W (1 and 5 minutes) and 30 W (1 and 5 minutes) in order to analyse the effect of power and time in the properties of the samples. The surface concentration of carboxyl groups was measured through the toluidine blue method [3]. On the other hand, the elemental surface analysis was carried out with an EDX device in a Hitachi TM3030 SEM microscope. The water contact angle was measured using an optical contact angle measuring device (JC2000D2). Regarding the biological evaluation, L929 fibroblasts were cultured on the surface of the samples and their metabolic activity was measured through the CCK-8 method.

**3. Results and Discussion** -. Table I shows the results of the physicochemical characterization of the samples, while the data from the biological evaluation are presented in Image I. It is possible to observe that time has a more remarkable influence than power on the concentration of carboxyl groups and elemental composition, while the trend is opposite for the WCA and viability of the cells.

**Table I.** Results of physicochemical characterization.

Group of samples	WCA (degrees)	Surface carboxyl concentration (nmol/cm <sup>2</sup> )	O/C ratio (atomic percentage)
Untreated PCL	88.5±4.6	0.42±0.03	0.338
PCL-10 W for 1 min	69.6±1.9	1.52±0.16	0.336
PCL-10 W for 5 min	69.2±2.3	2.17±0.08	0.349
PCL-30 W for 1 min	66.7±2.4	1.85±0.10	0.343
PCL-30 W for 5 min	49.4±6.4	2.32±0.21	0.347



**Image 1.** Cell viability results.

**4. Conclusions** – The operation conditions of plasma treatment play a complex and crucial role on the properties of PCL surfaces which affect their biological performance. These data are relevant for the optimization of this surface treatment for biomedical applications, especially in the Tissue Engineering field.

## 5. References

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- [3] S. Rödiger et al. *Analytical Chemistry* **83** (9) (2011) p. 3379-3385