Oxygen plasma treated collagen films for antibacterial properties

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Abstract:
Protein-based biomaterials are becoming increasingly popular for biomedical applications as they can replicate both chemical and mechanical properties of native tissues.
Type I collagen is the most widespread and the main component of extracellular matrix (ECM). It is easy to extract and has been successfully processed into 2D (films, membranes) and 3D structures (scaffolds and hydrogels) for biomedical applications, particularly for tissue regeneration and wound healing, thanks to its biocompatibility and biodegradability[1]. Biomedical polymers should be in direct contact with biological environment so a surface modification method would be one of the most effective ways to control the inflammatory response; this will result in improved outcomes once the material is implanted as part of a medical device[2].

In this project, oxygen cold gas plasma was employed to modify the surface of collagen films. The advantages of using plasma treatments are the short treatment time and the selective modification of the chemical and physical properties of the polymers surface without affecting the bulk. We investigated the effects of oxygen plasma treatment on the surface properties of collagen biomaterials, changing treatment time and power. After plasma treatment, collagen films have been functionalized via ammino-reduction. The films have been characterized using FT-IR to obtain information about the chemical of the treated surface, with SEM for morphology and roughness, with contact angle for hydrophilicity.

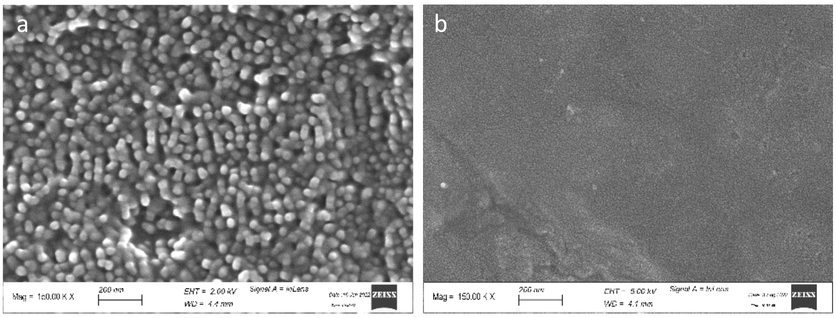

Figure 1 a) Oxygen plasma treatment collagen film; b) Oxygen plasma treatment collagen film after functionalization.

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