

Thermomechanical and Biocompatibility Properties of PVDF and P(VDF-TrFE) Forming Blends Containing Natural Polymers as Additives

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In this work the thermo-mechanical properties and the *in vivo* biocompatibility of new biomaterials based on PVDF, poly(vinylidene fluoride), and its copolymer P(VDF-TrFE), poly(vinylidene fluoride – trifluoroethylene), were studied. PVDF and P(VDF-TrFE) are of great scientific and technological interest due to their ferro, pyro, and piezoelectrical properties besides chemical and thermal stability [1]. Recently, their biocompatibility has been shown as well [2]. Therefore, considering all this potentiality, self-standing films of PVDF and P(VDF-TrFE) containing corn starch and/or latex of natural rubber as additives were produced by compressing/annealing forming blends for future applications involving tissue engineering. This process allows one to discard the necessity of using solvents to dissolve either PVDF or P(VDF-TrFE), which are toxic to human [3]. The thermo mechanical characterization of the films was made through TG, DSC, DMA, and mechanical compressing. The results showed that the polymers do not interact chemically with the additives leading to the formation of blends as physical mixtures (Figure 1). However, it was observed that the adhesion of the starch is better in the case of blends with P(VDF-TrFE). The biocompatibility study was performed *in vivo* in rats. The films were implanted subcutaneously and the tissue response to the material was histologically evaluated 7, 14, 21, 28, and 35 days after surgery. The microscopic analysis demonstrated that after 35 days the implanted materials remained intact, without degradation signals. Preliminary results of the histological analysis in terms of inflammatory reaction indicates the biocompatibility of the materials in study.

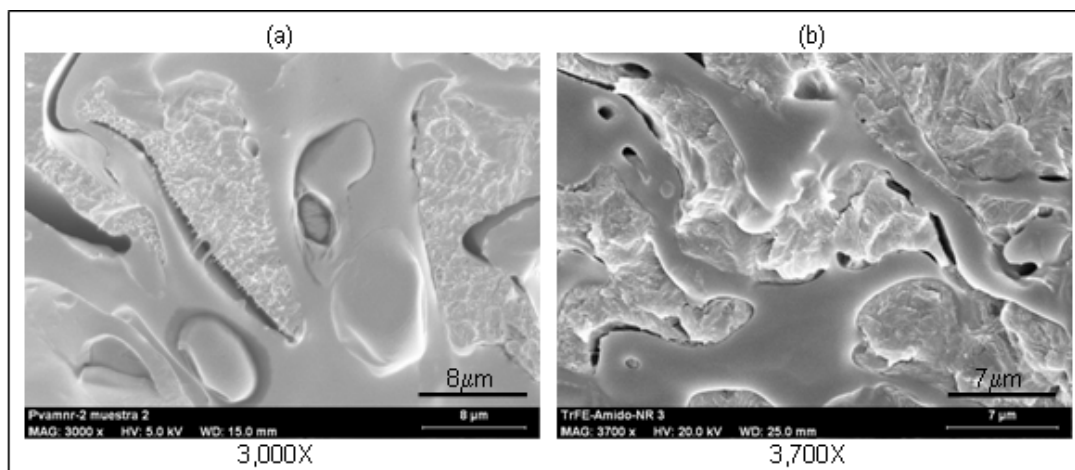


Figure 1: SEM (transversal section) of blends forming compressed films containing: (a) PVDF/starch/NR; (b) P(VDF-TrFE)/starch/NR.

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