Development of Lignin/PEO nanofibers by electrospinning technique for tissue engineering application

Reference	Presenter	Authors (Institution)	Abstract
01-075	Kamila Moreira Nogueira	Nogueira, K.M. (Instituto de Pesquisas Energéticas Nucleares / Universidade de São Paulo); Varca, J.O. (Instituto de Pesquisas Energéticas Nucleares); Lima, C.S. (Instituto de Pesquisas Energéticas e Nucleares - Universidade de São Paulo); da Cruz, C.C. (Instituto de Pesquisas Energéticas e Nucleares - IPEN); Ribeiro, A.H.(Instituto de Pesquisas Energéticas e Nucleares - Universidade de São Paulo); Freitas, L.F. (Instituto de Pesquisas Energéticas e Nucleares); Varca, G.H. (Instituto de Pesquisas Energéticas e Nucleares); Lugão, A.B. (Instituto de Pesquisas Energéticas e Nucleares);	Lignin is a renewable carbon source and has been widely explored in different areas over the last years, especially in biomaterials such as dressings and other biomedical devices due its natural origin and low cost. Its chemical structure confers interesting properties such as antioxidant capacity, UV protection, bactericidal action and appropriate adsorption. Poly (ethylene oxide) (PEO) is used in electrospinning to facilitate the formation polymer fibers. The electrospinning technique has been largely explored in the bioengineering area towards designing nanomaterial with minimum defect and high surface area. The present work aimed the development of a lignin/PEO nanofiber by electrospinning technique. In practical terms, lignin/PEO solution was prepared following two different methods. In the first approach, polymer stock solutions were prepared in alkaline water by stirring at 70 °C. In the second, the polymer powders were mixed and dissolved together in dimethylformamide (DMF) under stirring at 80 °C. By both methods, PEO/lignin solutions were prepared at 10, 20 e 30% (w,v) solid content, at the ratios 99/1 and 95/5. For electrospinning parameters, the distance between ejector and plate collector was set to 15-20 cm, voltage to 20 kV and injection flow to 1 mL/h, chamber temperature to 40 °C and 30%. Nanofiber morphology was assessed by scanning electron microscopy and optical coherence tomography. Apparent porosity was measured by classical Archimedes method. Due to higher DMF dielectric constant compared to water, results showed that nanofibers made using DMF presented smaller beats formation and smaller fiber diameter. Nanofibers with higher solid content presented more uniform fibers with larger diameter. Nanofibers with higher lignin concentration presented larger number of beats and higher fiber diameter. However, lignin improved the system porosity in all cases. Further mechanical and biological experiments will be done, nevertheless, the nanofiber developed is a promising material to be applied in tissue engineering.

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