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Production of polymer nanofiber by electro spinning for the enhancement of drug release rate

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Drug delivery method is one of the techniques that enable us the introduction of therapeutic agent in the human body. It can improve its efficiency by controlling the rate, the time and the site of release. Currently, due to the use of nanofiber which facilitates the delivery of sufficient amount of drugs for a certain time, avoids the degradation of non released drugs and eliminate the non uniform concentration of drugs during release many researchers have attracted by the sector including me. Based on this, for the lab scale production of polymer nanofiber, a biodegradable polymer Poly lactic acid (PDLLA) was used and for the encapsulation as an agent Albumin was used as a model drug during the investigation. By using electro spinning techniques, which is the production of filaments by electrostatic force, the nanofibers were produced by varying different parameters such as: flow rate, composition and voltage. Since the dispersion of drug is uniform and the drug released readily, emulsion technique was employed for the encapsulation of the drug in the polymer. The solvent used to dissolve both the drug and the polymer were Dichloromethyl, n- n-Dimethyl formamide and methanol-water mixture with the ratio of 5:3:2 respectively. Hence, the produced fibers were analyzed by Optical, Scanning electron microscope (SEM) and Co focal microscope. Consequently, the optimum product obtained for the delivery of Albumin (0.5%) was having a polymer concentration of 9%, voltage of 22KV and flow rate of 0.4ml/hr. Frankly, the optimum product has better fiber thickness and the drug has distributed uniformly in the fiber. Since there was a homogenous distribution of drug in the fiber the drug was released by diffusion within a short period of time than the conventional drug release techniques and the fast degradation of PDLLA nanofibers was also speed up the release rate.

Biography

Tibebe Fente is a material engineering master's student in Trento University, Italy. He did my BSc by Chemical Engineering from Addis Ababa University Institute of Technology in July 2011 and He was assistance lecturer in Bahir Dar University since September 2011- 2012.

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