H Esfahani et al., J Material Sci Eng 2015, 4:4
http://dx.doi.org/10.4172/2169-0022.C1.026

OMICS International
conferenceseries.com

International Conference and Expo on
Ceramics

August 17-18, 2015 Chicago, USA

Preparation and evaluation of nylon 6/non-stoichiometric hydroxyapatite membrane fabricated via electrospinning method for using in protein infiltration

H Esfahani[1,2], E Salahi[1], M Keyanpour-Rad[1], M P Prabhakaran[2] and S Ramakrishna[2]
[1]Materials and Energy Research Center, Iran
[2]National University of Singapore, Singapore

Separation processes are widely used in many sciences and industries, especially in biomedical applications. Protein adsorption by an appropriate membrane has significant role in patient treatment. The mechanism of protein adsorption onto a membrane is highly complex, and the interaction depends on the physicochemical properties of the surface like surface area, hydrophobicity, electrostatic charges, polar groups, chemical structure or the properties of the protein itself. In this study, to improve the protein adsorption, polycaprolactam (Nylon-6) nano-fibers were modified by positive electrostatic charged non-stoichiometric hydroxyapatite (nHAp) nano particles. Positive charged nHAp nano-particles provide driving force for adsorption of opposite charged proteins. The biocompatible zinc cations (Zn) (0, 4, 8 At %), were used to change the stoichiometric and also electrostatic charge of nHAp particles. Nano particles were synthesized by chemical precipitation method and composite membranes were prepared via electrospinning process. The desirable morphology was achieved at the optimized conditions: Concentration of Nylon/nano-particles (20/2 w/w), 17.5 KV applied voltage, 10 cm distance, 0.5 ml/h feed rate. The mechanism of protein fouling on optimized membrane during 1 h filtration was interpreted as cake filtration, standard and intermediate fouling in correspondence to the early (0 to 15 min), mediate (15 to 40 min) and final (40-60 min) period of filtration. The results showed that the optimized composite membrane adsorbed 258 mg/cm3 BSA after 1h filtration, indicating highest capacity of filtration in comparison to the other membranes. Results showed that, all adsorbed proteins can be released after 4.5 h back flushing by fresh solvent.

Biography

H Esfahani received his BS and MS in Organic Chemistry from California State University (San Jose , California , USA) in 1968 and 1972 , respectively and PhD in Polymer Science and Technology from Liverpool University (England) in 1977. He has worked as an organic chemist at Stanford Research Institute, SRI (Menlo park, California, USA) from 1968 till 1974. He has worked as a Researcher at the Materials and Energy Research Center (MERC) for 30 years. He is a full Professor and has served as an International Advisory and Editorial Board member in many world scientific journals. He has published many scientific papers in the word journals and international conference proceedings.

hap.esfahani@gmail.com

Notes: