

Ultrafine nanofabrication of Polyvinyl Alcohol (PVA)-Gelatin nanofibers via electrospinning using a tri-solvent system

Jopeth Ramis^{a*}

^aTechnological Institute of the Philippines-Manila, Quiapo, Manila, Philippines

*E-mail: jopethr@yahoo.com

ABSTRACT

Current fabrication of nanofibers from PVA, gelatin and PVA-gelatin use solvents such as water, aqueous solution of N,N-dimethylformamide (DMF), dimethyl sulfoxide (DMSO), and many other hazardous organic solutions, but it poses a great threat on sites that the solvent was unable to evaporate, affecting cell viability and motility. In this study, a new solvent system of deionized water, formic acid and glacial acetic acid was used to replace the current toxic solvent system utilized in electrospinning such polymers. The innovative solvent system was found to reduce the fiber diameter to about 5 times smaller than the conventional solvents. Moreover, increasing amounts of formic acid and deionized water decreased further the fiber diameter of the PVA-GEL nanofibers. Further refinement in solution (PVA:GEL ratio) and process parameters (Tip-to-collector distance and flow rate) produced much finer nanofibers, leading to a decrease in fiber diameter distribution and occurrence of beading with increasing amounts of acetic acid and formic acid. It is conclusive that a new alternative solvent system can be used in electrospinning PVA-GEL nanofibers that are non-toxic and exhibits much lower fiber diameter than the conventional solvents used before.

KEYWORDS: electrospinning; nanofibers; polyvinyl alcohol; gelatin