

Valorisation of Waste Chicken Feathers: Electrospun Antibacterial Nanoparticles-Embedded Keratin Composite Nanofibers

Authors : Lebogang L. R. Mphahlele, Bruce B. Sithole

Abstract : Chicken meat is the highest consumed meat in south Africa, with a per capita consumption of >33 kg yearly. Hence, South Africa produces over 250 million kg of waste chicken feathers each year, the majority of which is landfilled or incinerated. The discarded feathers have caused environmental pollution and natural protein resource waste. Therefore, the valorisation of waste chicken feathers is measured as a more environmentally friendly and cost-effective treatment. Feather contains 91% protein, the main component being beta-keratin, a fibrous and insoluble structural protein extensively cross linked by disulfide bonds. Keratin is usually converted it into nanofibers via electrospinning for a variety of applications. keratin nanofiber composites have many potential biomedical applications for their attractive features, such as high surface-to-volume ratio and very high porosity. The application of nanofibers in the biomedical wound dressing requires antimicrobial properties for materials. One approach is incorporating inorganic nanoparticles, among which silver nanoparticles played an important alternative antibacterial agent and have been studied against many types of microbes. The objective of this study is to combine synthetic polymer, chicken feather keratin, and antibacterial nanoparticles to develop novel electrospun antibacterial nanofibrous composites for possible wound dressing application. Furthermore, this study will converting a two-dimensional electrospun nanofiber membrane to three-dimensional fiber networks that resemble the structure of the extracellular matrix (ECM)

Keywords : chicken feather keratin, nanofibers, nanoparticles, nanocomposites, wound dressing

Conference Title : ICBCB 2022 : International Conference on Biomass Conversion and Biorefinery

Conference Location : Barcelona, Spain

Conference Dates : June 09-10, 2022