Development of Antimicrobial Materials for Food Packaging Applications

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The rising demand to increase fresh food shelf life as well as the need of protection against food-borne diseases urged the development of antimicrobial food packaging. Nanomaterials have increasingly being used in food packaging applications in recent years due to their extraordinary properties when compared to bulk materials. Nanoparticles provide signi? cant antimicrobial properties in different environmental conditions. Nowadays, there is heighten attention in designing nano particles incorporated food packaging with the introduction of nanotechnology. Silver nanoparticles (AgNPs) based antimicrobial packaging is an innovative form of food packaging used to extend shelf-life of food and reduce the risk of pathogens. AgNPs are one of the most powerful antimicrobial agents which can be used for increasing shelf life of foods due to its capacity to eliminate infectious micro-organisms. The present research work is based on the preparation of silver nanoparticles incorporated coating for polymer based packaging components. Nano Silver impregnated cross-linked polyvinyl alcohol coating was synthesized and applied on the polymer surface. In this study, wettability of the polymer surface was enhanced by a UV treatment. Contact angle was measured to confirmation of the wettability. The adhesion of the coating to polymer was obtained as load required to peel off the coating. Optimum UV treatment time was selected by using contact angle measurements and load required to peel off the coating. Thermal degradation of cross-linked Nano silver coating was determined using thermo gravimetric analysis. Presence of silver nanoparticles in the coating was confirmed by Surface Plasmon Resonance (SPR) and Scanning Electron Microscopy (SEM). The nano silver incorporated polymer was tested for its biocidal action against model bacteria Escherichia coli using zone inhibition and food contain in nano silver coated containers. Developed nano silver incorporated polymer based food packaging products showed antimicrobial properties. This developed product can be used to improve the quality of the food and extend shelf life especially in food packaging applications.