ABSTRACT

The amount of plastic pollution is growing daily, and new technologies are beingdeveloped to create packaging made of polymers that is biodegradable, economical,and environmentally benign. Chemical reduction methodwas used to prepared silverchitosancomposite and assisted with microwave irradiation.Themechanical,structural and antibacterial activity of composite were analyzed by UV–Visiblespectroscopy, fourier transform infrared spectroscopy (FTIR), scanning electronmicroscopy (SEM), zetapotential (ZP), disc diffusion method. Composite filmproperties were assessed, including swelling degree, film thickness, solubility,moisture retention capacity, water vapor transmission rate & biodegradability test.Two strains belonging to Priestia megaterium (PQ269828) & Klebsiella sp.(MN631045) was sequenced by 16S rRNA gene sequencing. UV-Vis showed maximum peak of absorption that was observed at wavelength 413nm, while FTIR observed that Ag-CH composite had a peak of absorption at near 1649.40cm-1 whichconfirmed the binding of Ag to chitosan N-H bond, via SEM composite film displayed a rough and compact surface morphology, Ag-CH composite had positive charge and stable in their position with potential 0.026mv as observed by (ZP) test. Disc diffusion method revealed that (Ag-CH) composite clearly showed greater inhibitory effect assessed by zone of inhibition (ZI) from 0.8-2.17mm against six food borne strains. It became clear that the moisture retention capacity, rate of water vapor transmission, swelling degree and solubility all marginally decreased due to the cross linker activity of AgNPs. By assessed shelf-life of tomato's wrapped in composite
film, the film real-time application was tested. Compared to the polymeric polyethylene film, the film composite incorporating AgNPs was successful in reduced contamination caused by bacteria. The film's size decreased in soil after 14 days of bio-degradation in comparison to control polyethylene (PE) film and chitosan.According to findings, synthetic composite film held all the perfect features of food packaging and was utilized due to biodegradable and bio-compatible polymeric food packaging as compared to plastic and an alternate option to increased shelf-life of fresh food. Future research could concentrate on the big-scale production & utilization
of polymer-based food packaging in an effort to decreased the environmental impact of non-degradable plastics. Composite film could find a broad range of application, like edible films, water purification, and anti-infectious wound dressing.