

Trends in nanocomposite technology for starch-based bioplastics

E C Egwim and A O Kalu

Federal University of Technology, Nigeria



Abstract

Nanocomposite technology has been well utilized to improve the properties of starch for packaging film applications. These nanomaterials have varying effects due to the difference in the properties of the nanomaterials as well as their molecular interaction with the glucose chains within starch polymer matrix. There is however unique peculiarities as well as gaps associated with each starch nanocomposite films and effects depend on the specific packaging application. Extensive works have been done to develop starch-based packaging films used to increase the shelf life of eggs, fruits and vegetables. The modified starch-nanocomposites film includes the use of nano lignin/nanofibre, chitosan, zinc oxide and graphene oxide. Nano zinc oxide (2%) sufficiently suppressed the growth of microorganisms and retains the quality of tomatoes when compared to LDPE films; significant improvement was also observed in the mechanical properties of the starch films mainly in the hardness, elastic and plastic works. A desirability of 89.1% was obtained for chitosan-starch films after optimal responses of all the variables for mechanical property, the films also displayed antimicrobial activity against a wide range of microorganisms found in eggplant and tomatoes. The highlight of starch Lignin/nanofibre films was the significant improvement in thermal stability and tensile strength. The films also significantly extended the shelf-life of packaged eggs. Optimization models for starch graphene oxide nanocomposite films are currently generated for the storage of different tropical fruits and vegetables.

Biography

E C Egwim is a Professor of Industrial Biochemistry and Bioprocess in the Department of Biochemistry, School of Life Sciences and Director, Centre for Genetic Engineering and Biotechnology. He has a dynamic academic career reflecting pioneering and edge-breaking performance in industrial raw material development, applied enzymology/biotechnology and bioprocess technologies. He has 120 publications with H-index of 27 and total and total citation of 2323. He has supervised and mentored over 50 postgraduates and several product patents. Currently, he is the Director, Centre for Genetic Engineering and Biotechnology, where he develops raw materials for indigenous industries.



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