

# Development of Chitosan Based Nanocomposites for Food Packaging Application <sup>†</sup>

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**Abstract:** Novel food packaging materials are becoming increasingly necessary, and extensive research is underway worldwide towards developing environmentally friendly and bio-based polymers. Among various biopolymers, chitosan is one of the noticeable and industrially suitable food packaging materials. However, chitosan in pristine form has various limitations such as low mechanical rigidity, high permeability against water vapors, gas molecules, reasonable thermal stability, etc., limiting its application as a food packaging material. An alternative way to overcome the above issues can be achieved by incorporating nanomaterials into the base chitosan matrix effectively. This research is based on the reinforcing chitosan with hybrid nanomaterials of zinc oxide and graphene oxide to produce a mechanically rigid material with lower water and gas permeation. The results showed that compared to pristine chitosan, hybrid films of Chitosan/ZnO/GO significantly improved the resistance against the water vapors. Another desirable property, namely the antimicrobial characteristics of hybrid nanocomposites, is also measured. Pristine chitosan showed good antimicrobial activity against gram-negative bacteria of *E. coli*. However, the hybrid film showed higher activity against *B.subtilis*. This indicates that the hybrid chitosan/ZnO/GO nanocomposites have successfully reduced the water vapors' permeability compared to chitosan, along with improved antimicrobial properties.

**Keywords:** food packaging; chitosan; zinc oxide; graphene oxide; hybrid nanocomposite; water vapour permeability; anti microbial.

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## Conflicts of Interest

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