

CHARACTERIZATION OF ZINC OXIDE NANOPARTICLES AND THEIR APPLICATIONS IN FOOD SAFETY

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ABSTRACT

In this study, ZnO NPs suspension was studied for their antibacterial activities against *Escherichia coli* O157:H7. Beef cuts inoculated with *E. coli* O157:H7 were wrapped with 5% (wt %) yam starch films incorporated with ZnO NPs suspension of 0, 6 and 12 mM and refrigerated at 4°C. An average of 0.5-log reduction of the bacteria growth of the cocktail mixture of three *E. coli* O157:H7 strains was observed with yam starch films containing 6 or 12 mM ZnO NPs in three replications after 8 days.

Various concentrations of ZnO NPs powder from 0.05 to 1% w/w were added to corn starch. The presence and characterization of ZnO NPs in corn starch was investigated by scanning electron microscopy (SEM), and transmission electron microscopy (TEM), and energy-dispersive X-ray spectroscopy (EDS). Quantification of ZnO NPs was determined by inductively coupled plasma optical emission spectrometry (ICP-OES).

To the best of our knowledge, this is the first systematic methodologies presented for detection, characterization, and quantification of ENPs in a food sample by a combination of methods. It could potentially be applied to other common NPs such as TiO₂ NPs and MgO NPs in other food products.