

## Papain Immobilized Polyurethane Film as an Antimicrobial Food Package

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**Abstract :** Food contamination occurs during post process handling. This leads to spoilage and growth of pathogenic microorganisms in the food, thereby reducing its shelf life or spreading of food borne diseases. Several methods are tried and one of which is use of antimicrobial packaging. Here, papain, a protease enzyme, is covalently immobilized with the help of glutaraldehyde on polyurethane and used as a food wrap to protect food from microbial contamination. Covalent immobilization of papain was achieved at a pH of 7.4; temperature of 4°C; glutaraldehyde concentration of 0.5%; incubation time of 24 h; and 50 mg of papain. The formation of -C=N- observed in the Fourier transform infrared spectrum confirmed the immobilization of the enzyme on the polymer. Immobilized enzyme retained higher activity than the native free enzyme. The efficacy of this was studied by wrapping it over *S. aureus* contaminated cottage cheese (paneer) and cheese and stored at a temperature of 4°C for 7 days. The modified film reduced the bacterial contamination by eight folds when compared to the bare film. FTIR also indicates reduction in lipids, sugars and proteins in the biofilm.

**Keywords :** cheese, papain, polyurethane, *Staphylococcus aureus*

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