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(57) Abstract :

The present invention relates to a silver–alginate nanoparticle-based active packaging system designed to extend the shelf life of perishable goods. The system integrates antimicrobial silver nanoparticles within a biodegradable alginate polymer matrix to inhibit the growth of spoilage and pathogenic microorganisms at the food–packaging interface. The alginate matrix provides biocompatibility, controlled release of antimicrobial agents, and environmental sustainability, ensuring food safety while minimizing ecological impact. The proposed packaging material can be fabricated as films, coatings, or containers and is suitable for a wide range of perishable food products, including fruits, vegetables, meat, seafood, dairy, and ready-to-eat foods. By reducing reliance on chemical preservatives and conventional plastic packaging, the invention enhances food quality, minimizes waste, and supports sustainable packaging solutions, offering an effective and eco-friendly approach to modern food preservation challenges.

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