Abstract

Smart or intelligent food packaging is a system with advantages of providing the user with ability to monitor and record the critical parameters for the food quality such as changes in the food, its environment condition, and packaging integrity. This technology in food supply chain, causes to decrease food loss and waste and avoid unnecessary transport and logistics from an early stage. The intelligent devices may be incorporated in packaging materials or attached to the inside or outside of a package. For this purpose, two types of films including Persian gum-methyl cellulose-nanocellulose-extract of petals of saffron and *Lepidium perfoliatum* seed gum -nanocellulose-extract of petals of saffron were prepared and their properties, including solubility in water, humidity, turbidity, thickness, water vapor permeability, imaging of them by scanning electron microscopy (SEM) and their antimicrobial properties were investigated. The results showed that the addition of the extract increased moisture, solubility and water vapor permeability of both films compared to the control sample and there was no significant difference ($P < 0.05$) between the film thickness and the addition of the extract. Antibacterial properties of films against *Salmonella typhimurium* (PTCC 1609) and *Staphylococcus aureus* (PTCC 1189) were performed in a 12-hour interval. The results showed that only ghoddume-nanocellulose-extracts of saffron petals on *staphylococcus aureus* (PTCC 1189) have inhibitory effect.

key words: Biodegradable film, *Lepidium perfoliatum*, Persian gum, Cellulose nanocrystal, Saffron petals

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Preparation of intelligent and bioactivity packaging using *Lepidium perfoliatum* seed gum - nanocellulose and Persian gum -nanocellulose in combination with petal extract of saffron (*Crocus sativus* L.*)*

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