

Carboxymethyl Cellulose Coating onto Polypropylene Film Using Cold Atmospheric Plasma Treatment as Food Packaging

Authors : Z. Honarvar, M. Farhoodi, M. R. Khani, S. Shojaee-Aliabadi

Abstract : Recently, edible films and coating have attracted much attention in food industry due to their environmentally friendly nature and safety in direct contact with food. However edible films have relatively weak mechanical properties and high water vapor permeability. Therefore, the aim of the study was to develop bilayer carboxymethyl cellulose (CMC) coated polypropylene (PP) films to increase mechanical properties and water vapor resistance of each pure CMC or PP films. To modify the surface properties of PE for better attachment of CMC coating layer to PP the atmospheric cold plasma treatment was used. Then the PP surface changes were evaluated by contact angle, AFM, and ATR-FTIR. Furthermore, the physical, mechanical, optical and microstructure characteristics of plasma-treated and untreated films were analyzed. ATR-FTIR results showed that plasma treatment created oxygen-containing groups on PP surface leading to an increase in hydrophilic properties of PP surface. Moreover, a decrease in water contact angle (from 88.92° to 52.15°) and an increase of roughness were observed on PP film surface indicating good adhesion between hydrophilic CMC and hydrophobic PP. Furthermore, plasma pre-treatment improved the tensile strength of CMC coated-PP films from 58.19 to 61.82. Water vapor permeability of plasma treated bilayer film was lower in comparison with untreated film. Therefore, cold plasma treatment has potential to improve attachment of CMC coating to PP layer, leading to enhanced water barrier and mechanical properties of CMC coated polypropylene as food packaging in which also CMC is in contact with food.

Keywords : carboxymethyl cellulose film, cold plasma, Polypropylene, surface properties

Conference Title : ICFSMQFS 2017 : International Conference on Food Safety Management and Quality in Food Science

Conference Location : Rome, Italy

Conference Dates : September 18-19, 2017