

Salinda Butkinaree 2009: Effects of Biopolymer Coating on Barrier and Mechanical Properties of Paperboards. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging Technology. Thesis Advisor: Assistant Professor Tunyarut Jinkarn, Ph.D. 134 pages.

Water, oil and gas barrier as well as mechanical properties are importance characteristics of paperboard for food packaging. At present, these properties can be improved by coating paperboard with plastics or waxes which will cause environmental problems. This research aims to improve mechanical and barrier properties of paperboard by coating with biopolymers derived from carbohydrate, lipid, and protein. Carbohydrate based biopolymer selected for the study was hydrophobic starch since starch is a major additive in paper industry originally. For this research, concentration of starch was set at 15 % (w/w) to be in accordance with concentration level applied in paper industry. Other biopolymers to be used with hydrophobic starch were stearic acid and zein solution. This research composed of three parts. First part was to investigate effects of coating stearic acid and zein in combination with hydrophobic starch on paperboard's properties. Results showed that compression strength and stiffness were significantly decreased ($p \leq 0.05$) where as water and oil resistance was significantly increased ($p \leq 0.05$) with the increase of stearic acid's concentration. For zein solution coating in combination with starch layer, compression strength and stiffness were significantly increased ($p \leq 0.05$) and water and oil resistance were significantly increased ($p \leq 0.05$) with the increased of zein's concentration. However, stearic acid coating resulted in significantly high oxygen transmission rate (OTR) ($p \leq 0.05$) and zein coating resulted in significantly low oxygen transmission rate (OTR) ($p \leq 0.05$). Furthermore, improvement of paperboard' properties were better detected on uncoated back surface that has no calendaring effects. The second part of the research was to study the effects of coating stearic acid in hydrophobic starch together with zein solution coating on paperboard properties. Results showed that coated paperboard with stearic acid and zein at the ratio of 1:3 had the best compression strength and stiffness while ratio of 3:1 had the best water and oil resistance. In addition, combination of both zein and stearic acid coating were less effective than coating with either zein or stearic acid individually. The last part of the study was to observe the effects of storage time. For the results, paperboard coating with starch blended stearic acid at its maximum concentration under the study at 3 % (w/w) showed the highest water and oil resistance and paperboard coating with starch in combination with zein layer at zein's maximum concentration at 3 % (w/w) showed the highest compression strength and stiffness throughout four weeks of storage time.

Student's signature

Thesis Advisor's signature