

Suchada Thawornwiriyanan 2008: The Improvement of Water Resistance Property of Paperboard by SF₆ Plasma. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging Technology. Thesis Advisor: Assistant Professor Tunyarut Jinkarn, Ph.D. 112 pages.

The objective of this research was to improve water resistance property of paperboard for packaging application by SF₆ plasma. 300 g/m² single-side coated Duplex board was selected for the study. The study composed of three sections. First section was to investigate effects of plasma conditions on water resistance property of paperboard. Three plasma conditions to be studied were RF power at 25, 50 and 75 W with gas pressure of 20, 50, 100 and 200 mTorr. Treatment time was fixed at 10 minute for this point of the study. The second section was the study on effects of treatment times on physical, mechanical and barrier properties of treated paperboard. Treatment times proposed for the study were at 2, 10, 60 and 600 second respectively where as plasma condition was fixed according to the best plasma condition derived from the first part of the study. The last section was the study on effects of storage times on water resistance property of treated paperboard. For the study, storage times were set for 28 days at regular warehouses of tropical regions (25-32°C, 48-74 %RH). According to the result of the first part, plasma condition at 50 W at 100 mTorr provided the best water resistance properties on paperboard surface. For the second part of the study, results showed that SF₆ plasma treatments significantly improved water resistance property of treated paperboards started from only 2 second treatment time ($p \leq 0.05$) and longer treatment time showed better water resistance properties. Further, plasma treatment had no affect on basis weight, thickness and moisture content of paperboard. However, brightness and colors of treated paperboard were slightly changed. Effects of plasma treatment on mechanical properties showed that plasma treatment had no effect on tensile strength of treated paperboards; however, MD compression strength as well as MD and CD folding endurance of treated paperboards were significantly lower than untreated sample ($p \leq 0.05$). For barrier property, plasma treatment significantly improved oil resistance property of treated paperboard ($p \leq 0.05$). However, water vapor and oxygen permeability of treated paperboard were significantly higher than untreated sample ($p \leq 0.05$). Moreover, the results showed that plasma treatment was more effective on uncoated paperboard surface. For the last section of the study, the results showed that water resistance of treated paperboards was decreased with longer storage time. However, for 60 second treatment sample, water resistance property remained unchanged.

Student's signature

Thesis Advisor's signature

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