

Samaporn Rojthongkam 2014: The Improvement of Water Resistance Property of Recycled Paper and Thermoplastic Starch Blend by C_3F_6 Plasma . Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging and Materials Technology. Thesis Advisor: Assistant Professor Tunyarut Jinkarn, Ph.D. 142 pages.

In this study, the effect of hexafluoropropylene (C_3F_6) plasma treatment on bio-based materials composed of recycled Kraft paper and biopolymer sheet thermoplasticstarch blend was investigated. The study composed of four sections. The first section was a study on the effect of plasma treatment on water resistance properties of recycled paper. Plasma conditions use in this study were RF power and treatment time. RF power levels were varied 100, 150, 200 250 and 300 watts and treatment times were at 1, 3, 5 and 10 minutes. Second section was a study on the effect of plasma treatment on water resistance properties of biopolymer sheet applying feasible plasma conditions obtained from the first section. The third section was a study on the effect of plasma treatment on physical, barrier and mechanical properties of both materials and the fourth section was a surface analysis of bio-based materials after plasma treatment. The results showed that C_3F_6 plasma treatment significantly improved water resistance properties of both materials. Plasma conditions at 300 W for 10 min provided the highest water resistance for both materials. In addition, plasma treatment had no effect on the basis weight, thickness and moisture content of both bio-based materials. However, the color of both materials was slightly changed after plasma treatment. For barrier properties, plasma treatment significantly ($p \leq 0.05$) reduced water vapor and oxygen transmission rates of both paper and biopolymer sheet. However, plasma treatment on recycled paper showed better result in oxygen transmission rate. For mechanical properties, both materials showed lower tensile strength after plasma treatment and the effect is greater in biopolymer sheet than recycled paper. Surface analysis of recycled paper displayed an increase in surface roughness which may be due to plasma etching. According to the analysis, C-F bonding was detected on paper surface after plasma treatment. For biopolymer sheet, thin film may be obtained after plasma treatment since smoother surface was observed, indicating minor effect on plasma etching.

Student's signature

Thesis Advisor's signature