

Duangkamon Phokhaphaiboonsuk 2012: Surface Treating Agent of TiO_2 Nanoparticle/Epoxy Resin of LDPE Film for Flexographic Printing. Master of Science (Packaging Technology), Major Field: Packaging Technology, Department of Packaging and Materials Technology. Thesis Advisor: Assistant Professor Lerpong Jarupan, Ph.D. 92 pages.

This research aimed to study printing qualities of low density polyethylene (LDPE) film by a cast coating with titanium dioxide (TiO_2) nano-particles mixed in epoxy resin for surface treatment to enhance the surface energy. Surface energy modification of the treated LDPE film used two different TiO_2 nano-particles in size (100 nm and 150 nm) and various loadings (0.5%, 1.0%, 2.0% and 4.0%, on weight basis). Surface energy of the coated LDPE film was compared with that of an uncoated LDPE film and a commercial treated LDPE film. There were printed by IGT printability tester with 4 alcohol-based flexographic printing ink *viz.*, cyan, magenta, yellow, and black, which are process colors. The print qualities in terms of visual appearance, color change, abrasive resistance, ink density and adhesion of the TiO_2 -coated film, uncoated film, and commercial film were analyzed and compared. The results showed that the coating with TiO_2 nanoparticles could improve surface energy of the LDPE film although the surface energy of the coated film was less than the commercial printing film. However, it was suggested that better abrasion resistance and ink adhesion after the coating can be achieved if the technique in the distribution of particles for less agglomeration is done. Tensile strength after the coating with 0.5% 100-nm TiO_2 nano-particles was increased to 30.904 MPa. This condition showed the least agglomeration on the coating layer. To this end, it can be concluded in this study that the 0.5% 100-nm TiO_2 nano-particles was a suitably sufficient loading to use for surface treatment of LDPE film in order to prepare the surface for flexographic printing.

Student's signature

Thesis Advisor's signature