Synthesis and Characterization of Acrylic Based Pressure Sensitive Adhesives Reinforced by Organically Modified Montmorillonite.

Jayasinghe D.[1*], Kuruwita-Mudiyansekage T.[1], Liyanage N.[2]

[1] Department of Chemistry, Faculty of Applied Science, University of Sri Jayewardenepura
[2]Department of Bio systems Technology, Faculty of Technology, University of Sri Jayewardenepura

Abstract: Acrylic based pressure sensitive adhesives (PSA) were synthesized by changing the monomer combinations and introducing hydroxyethyl acrylate (HEA) as a functional monomer. The impact of nano-fillers on mechanical properties of the said adhesive was analyzed by incorporating different dosages of modified and unmodified grades of montmorillonite. Monomer mixture of n-butylacrylate (BA), 2-ethylhexyl acrylate (2-EHA), Hydroxyethyl acrylate (HEA) and Methacrylic acid (MAA) monomer mixtures were used to disperse the nano-clay. Mechanical blending technique was used to disperse the nano-clay with the synthesized adhesives.

Adhesive synthesized using the combination of BA/2EHA exhibit remarkable improved properties for tack and peel strength. However, shear strength of synthesized adhesives was not up to the standard level. Adhesion performance of water based PSAs mainly depend on monomer composition. Percentage of HEA present in the adhesive was increased and the shear strength of the adhesive samples increases accordingly.

When we consider the shear strength of the adhesive series having nano-clay, all the adhesives displayed better improvement of shear strength with the increase of MMT and OMMT percentages. However, tack and peel values have gradually decreased. Adhesive with MMT showed better shear strength compared to adhesives containing OMMT as a nano-filler. The optimized adhesion properties were obtained in the range of 0.1 to 0.25% composition of nano-clay. At this range all three properties (peel, shear and tack) of the adhesive were well balanced.

IR data confirm the desired synthetic products. Tg values obtained from DSC thermo grams are in the range of -48 ^{0}C to -55 ^{0}C and therefore all the adhesives are soft polymers. Generally, soft polymers are highly tacky in nature, when it is elastic and flexible. All the adhesive samples have only one Tg which indicate that all the adhesives are random copolymers.

Keywords: pressure sensitive adhesives, acrylic, montmorillonite

Corresponding Author: damithnjayasinghe@yahoo.com