

Determination of Thermal Properties of Crosslinked EVA in Outdoor Exposure by DSC, TSC and DMTA Methods

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Abstract : The objective of this study is to better understand the thermal characteristics and molecular behaviour of cured EVA before and after outdoor exposure. Thermal analysis methods as DSC, TSC and DMTA studies were conducted on EVA material. DSC experiments on EVA show a glass transition at about -33.1°C which is characteristic of crystalline phase and an endothermic peak at temperature of 55°C characteristic of amorphous phase. The magnitude of the integrated temperature DSC peak for EVA is 14.4 J/g . The basic results by TSC technique is that there are two relaxations that are reproducibly observed in cured EVA encapsulant material. At temperature polarization 85°C , a low temperature relaxation occurs at -24.4°C and a high temperature relaxation occurs at $+30.4^{\circ}\text{C}$. DMTA results exhibit two $\tan\delta$ peaks located at -14.9°C and $+66.6^{\circ}\text{C}$. After outdoor exposure cured EVA by DSC analysis revealed two endothermic peaks due to post crystallization phenomenon and TSC suggests that prolonged exposure selectively effects the poly(vinyl acetate)-rich phase, with much less impact on the polyethylene-rich phase.

Keywords : EVA, encapsulation process, PV module, thermal analysis, quality control

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