SYNTHESIS AND CHARACTERIZATION OF NANOPARTICLES OF PVDF/PMMA BLENDS WITH IPN FOR PHOTOVOLTAIC BACKSHEET COATING

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The nanoparticles of PVDF/PMMA blends with interpenetrating polymer networks (IPN) were synthesized using the two-step polymerization method. In the first step, PVDF nanoparticles were prepared by emulsion polymerization using a fluorinated surfactant, and used as a seed for the following polymerization. In the second step, MMA emulsion was introduced to the emulsion of PVDF nanoparticles, and polymerized with a hydrocarbon surfactant. The nanoparticles of PVDF seed and PVDF/PMMA blend synthesized in this study were characterized by transmission electron microscopy (TEM) and differential scanning calorimetry (DSC) and contact angle measurements. The sizes of the nanoparticles of PVDF seed and PVDF/PMMA blend were approximately 55~75 and 70~90 nm, respectively.

It could be confirmed by comparing the nanoparticle sizes and DSC data that the nanoparticles of PVDF/PMMA blends with interpenetrating polymer networks were well synthesized. The coating layers prepared using the nanoparticles of PVDF/PMMA blends with interpenetrating polymer networks show good compatibility with PET and low surface energy.

We have prepared and characterized a coating formulation of PVDF/PMMA nanoparticles for use in backsheet constructions for photovoltaic modules. The resulting backsheets coated with PVDF/PMMA nanoparticles with IPN show excellent weatherability, good adhesion strength between PVDF/PMMA coating and PET, and excellent gas-barrier properties for oxygen and water vapor.

Keywords: PVDF/PMMA Nanoparticles, Synthesis and Characterization, Photovoltaic Backsheet

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