

Water and Oxygen Barrier Properties of PVDC/Silica Hybrid Coating Film

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The organic/inorganic hybrid coating materials were prepared using poly(vinylidene chloride-co-acrylonitrile) as the organic phase. During sol-gel process, the 3-glycidoxypropyltrimethoxysilane(GPTMS) as a silane coupling agent was added to enhance phase compatibility between organic PVDC phase and inorganic silica phase. The effects of GPTMS and composition of hybrids on the gas barrier property, phase morphology, thermal stability, and optical transparency were investigated. GPTMS used in this study was found to be effective coupling agent to improve the phase attraction between two phases, resulting in stable microstructure with uniform and homogeneous dispersion of silica particles. The film coated with PVDC/silica hybrid produced at optimum amount of TEOS and GPTMS showed significantly increased water and oxygen barrier properties relative to the pure PET substrate. Above silica content of 20 wt%, on the other hand, the permeability was increased owing to micro-phase separation and micro-crack formed on the surface of the coated film, which could be observed from the surface topology by AFM.