

紫外線、熱線遮蔽能を有する 有機無機ハイブリッド材料の開発と材料特性（I報）

Development of Polymer / Inorganic Hybrid Materials with Ultraviolet / Heat-rays Protection and Their Physical Properties (Part I)

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Abstract

We prepared poly (propylene glycol) (PPG) / titania and poly (ethylene glycol) (PEG) / CuO hybrid materials with the ultraviolet and heat-rays protection by using the sol-gel method.

In the case of the PPG / titania hybrid films, the hybrids showed high transparency in the visible light region and the film containing 10 wt% TiOPr cut off the ultraviolet region below 320 nm. Inorganic domains composed of titania and silica were formed in the hybrids, the size of the domains increased with increasing TiOPr. The PPG segments were restricted, and the storage modulus at the rubbery-plateau region increased with increasing TiOPr. The increase in M_n of PPG increased the amount of titania per ethoxysilyl end groups of PPG when the TiOPr content was constant, and the domain size thus became larger.

In the PEG / CuO hybrid films, the hybrid containing 20 wt% CuOEt cut off the ultraviolet region below 400 nm, and it was transparent in the visible light region of 500 nm. Furthermore, it cut off heat-rays of 850 to 1100 nm. All hybrid materials were formed 3D networks via Si-O-Si bonds. CuO was amorphous state in the hybrids, and it was dispersed as CuO clusters in the PEG matrixes.

キーワード：有機無機ハイブリッド材料、ゾル-ゲル法、シランカップリング材、金属アルコキシド、紫外線・熱線遮蔽

Keyword: Polymer inorganic hybrid materials, Sol-gel method, Silane-coupling agent, Metal alkoxide, UV・heat-rays protection

1. はじめに

近年、自動車産業分野において、車体の軽量化による排ガス規制の達成に向けた自動車メー

カー各社の取り組みが活発で、ガラス代替材料としてポリカーボネート (PC) 樹脂やポリウレタン (PU) 樹脂の研究開発が盛んに行われている¹⁾。従来の車両用ガラス窓に比べて、樹脂を用いた場合には耐摩耗性や耐候性が低く課題となっていた。このために、PCやPU樹脂を樹脂グレージングに用いる場合、ハードコート処理が必要不可欠であり、ゾル-ゲル法を用

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