

高機能ポリ乳酸の開発

——環境低負荷型ハードコーティング剤の開発——

Development of Environmentally Friendly Hard Coatings

山田 保治

Abstract

Nowadays, biomass plastics are under great attention because of the global environmental problem, and have been developed as substitute materials for petrochemicals from the viewpoint of global environmental conservation. Especially polylactic acids (PLAs) are one of the most potential materials with biodegradability, good physical and mechanical properties, and have already applied for mobile phones, PC packages, coatings, and parts for automobiles. However, PLAs do not have sufficient properties such as thermal stability and ductility, so that the improvements are necessary for commercial uses. On the other hand, a lot of polymer-silica nanohybrids with both of organic and inorganic properties have been developed to improve thermal stability, mechanical properties, and durability by incorporating silica into polymers.

In this study, PLA-silica hybrids were synthesized by sol-gel method to improve thermal and surface properties. The thermal (thermal degradation and glass transition temperatures) and surface properties (surface hardness) were improved by hybridizing silica with PLA. The pencil hardness of the hybrid coatings showed 5H. The PLA-silica hybrid coatings are defined as “Biomass Plastics” and expected to apply to environmentally friendly hard coatings.

キーワード：ポリ乳酸、ハイブリッド、バイオマスプラスチック、ハードコーティング剤、
表面硬度

Keywords: Polylactic acid, Hybrid, Biomass plastic, Hard coatings, Surface hardness

1. はじめに

20世紀の急速な化学技術の発展により引き起こされた地球環境の悪化が、近年、深刻な社会問

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YAMADA Yasuharu

題になっている。それらの中で特に地球温暖化現象は、石炭や石油などの化石燃料によって発生する大気中の二酸化炭素濃度の上昇に起因すると考えられている。これら環境問題からの脱却のため、環境保全、省資源、リサイクルなどあらゆる面で持続性社会への移行が重要視されるようになってきた。とりわけ、エネルギー、資源の観点から、過度の石油依存からの脱却が