〈技術資料〉

植物由来のゲル化剤と脂肪酸を用いた超撥水表面の作製

Fabrication of Superhydrophobic Surfaces Using Plant-derived Gelators and Fatty Acids

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Abstract

Superhydrophobic surfaces were obtained easily from a mixed solution of a plant-derived gelator and a fatty acid by a casting method: hydrogenated castor oil, 12-hydroxystearic acid, aluminum distearate, and calcium distearate were used as a gelator. Superhydrophobic surfaces having a contact angle with 150° or more and a sliding angle with 10° or less were formed under controlled conditions involving mixing ratios of a gelator and a fatty acid, purity of fatty acids, solvent species, and preparation temperatures. The superhydrophobicity of the surface was attributable not only to hydrophobicity of gelators and fatty acids but also to a surface roughness at nano-/micro-scale. For example, a superhydrophobic surface prepared from a mixed solution of hydrogenated castor oil and stearic acid was constructed by fibers ca. 100 nm in diameter and plate-like crystals from 0.5 to 2 μm in width. When the method using mixtures of gelators and fatty acids was applied to paper materials, superhydrophobic papers similar to original ones in appearance were obtained, and had higher mechanical strength than original ones under a wet condition.

キーワード：超撥水、ゲル化剤、脂肪酸、植物由来化合物、自己組織化

Keywords: Superhydrophobic surfaces, Gelators, Fatty acids, Plant-derived compounds, Self-organization

1.　はじめに

蓮や里芋の葉、水鳥の羽など、自然界では「水をよくはじく」という現象がしばしば見られる。このよくはじくというのは感覚的な表現であり、我々は水滴が球体に近いということ、水滴が転がりやすいことの二つの視覚的な情報からその程度を判断している。前者の程度を示す指標として、液面と固体面とのなす角度である接触角（θ）がある（図1(a)～(d)）[1~3]。接触角θが90° 未満の場合は親水性、90° 以上を撥水性、150° 以上を超撥水性といい、θが大きくなるほど結果として水滴は球体に近づいていく。また、水滴の転がりやすさは、滑落角（転落角）αにより直接的に評価できる（図1(e)）。水平な状態で基材に水滴を載せ徐々に傾斜させていくと、水滴が滑り始める角度が滑落角αである。つまり、θが大きくαが小さい

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