

テングシロアリの翅の表面構造を模倣した霧から水を集める機能性薄膜の作製

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Fabrication of functional thin films mimicking the surface structure of Termite wings for collecting water from fog (¹ Fac. Sci. Tech., Ryukoku Univ., ² Dept. of Chem., Rikkyo Univ., ³ Sch. Pharm., TUPLS, ⁴ RIKEN) ○Yuki Hashimoto,¹ Yohei Hattori,¹ Ryo Nishimura,² Satoshi Yokojima,³ Shinichiro Nakamura,⁴ Kingo Uchida¹.

The surface structure of termite wing (*Nasutitermes sp.*), which exhibit a dual wettability that repelling raindrops and collecting fogs, was mimicked using microcrystalline films containing a mixture of two diarylethene derivatives **1o** and **2o**.¹⁾ It transferred onto a versatile low-cost material and investigated whether the double wettability can be reproduced. It was reproduced by making a concave mold with polyvinyl alcohol and the transferring onto polystyrene. The film showed contact angle of $145.2 \pm 2.7^\circ$ with water droplets, indicating water repellency. Using a fog sprayer, we confirmed that fog with a diameter of around 0.1 mm were collected, and large water droplets with a diameter of 0.2 mm or more were repelled (Fig. 1). This was very similar to the surface characteristics of the termite wing.

Keywords: Biomimetics; Termite wing; Structural Transcription; Collecting Fog; Photochromic Diarylethene

雨粒を弾き、霧を集める二重濡れ性を示すテングシロアリの翅の表面構造を二種類のジアリールエテン誘導体 **1o**、**2o** を混合した微結晶膜を用いて模倣した¹⁾。この表面構造を汎用的な安価な材料へ転写し、二重濡れ性が再現できるか検討した。**1o**、**2o** の微結晶膜にポリビニルアルコールで雌型を取り、これから再度、ポリスチレンで転写することで、最初の微結晶膜の表面構造を再現した。この膜は、水滴接触角 $145.2 \pm 2.7^\circ$ の撥水性を示した。霧吹きで霧を吹きかけると、直径 0.1 mm 前後の霧粒を集め、直径 0.2 mm 以上の大きな水滴は弾くことを確認した (Fig. 1)。これは、テングシロアリの表面のもつ性質に酷似していた。

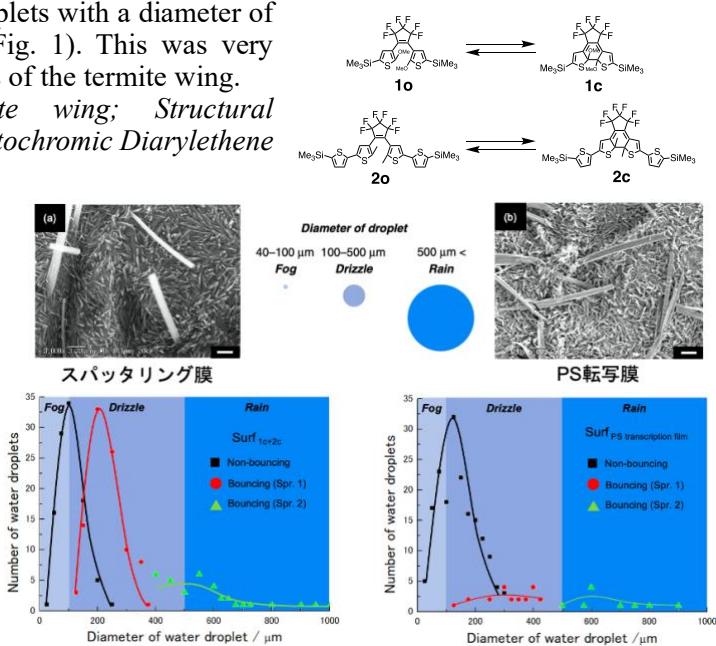


Figure 1. The diameter classification and size distribution of water droplets on polystyrene films. The surface structure of polystyrene films was obtained by transferring from a template of a diarylethene microcrystalline film to mimic termite wing.

1) R. Nishimura, K. Hyodo, H. Mayama, S. Yokojima, S. Nakamura, K. Uchida, *Commun. Chem.* **2019**, 2, Article number 90.