

n 型共役ポリマー半導体の配向性フローティングフィルムの作製 Preparation of Oriented Floating Film of n -type Polymeric Semiconductor

°(M2) 杉田 有哉¹, Manish Pandey¹, Heriyanto Syafutra¹, Yongyoon Cho¹, Varun Vohra²,
辨天 宏明,¹ 中村 雅一¹

¹Nara Institute of Science and Technology, ²The University of Electrocommunications

E-mail: sugita.yuya.st9@ms.naist.jp

Organic electronic devices using conjugated polymers (CPs) have gained a lot of attention in the past three decades for potential application in futuristic devices such as wearable electronics, flexible displays and sensors [1]. CPs are a potential candidate for the active layer of organic field-effect transistor (OFETs) due to inherent flexibility, high solubility in organic solvents, and ease of film processing. Furthermore, mobility in OFET enhances when CPs are oriented along the channel direction [2]. Different methods have been reported to orient CPs in one direction using solution processing. However, most of them are neither suitable for large-area film fabrication nor compatible with multilayer formation for hetero-structured devices [3]. At the same time, there are very few reports about the characteristics and preparation of oriented n -type CPs [3].

The unidirectional floating film transfer method (UFTM) for large-area film fabrication with oriented polymer chains offers various advantages in solving most of the existing issues with other conventional techniques [4]. In this work, we will present the fabrication of floating film of n -type CP, Poly{[N,N' -bis(2-octyldodecyl)-naphthalene-1,4,5,8-bis(dicarboximide)-2,6-diyl]-alt-5,5' -(2,2' -bithiophene)} (N2200), using UFTM {Fig. 1 (a)}. These films can be transferred on either rigid or flexible substrates just by their adhesive force. Films were found to be oriented along the width of the ribbon-shaped films [4]. Dichroic ratio (DR) was found to be highly dependent on the casting parameters of FTM. One of the representative polarized absorption spectra of oriented N2200 films prepared using UFTM is shown in Fig.1 (b), where with DR of ca. 3.2 was obtained. Charge transport anisotropy of thus oriented films in OFETs will be also discussed.

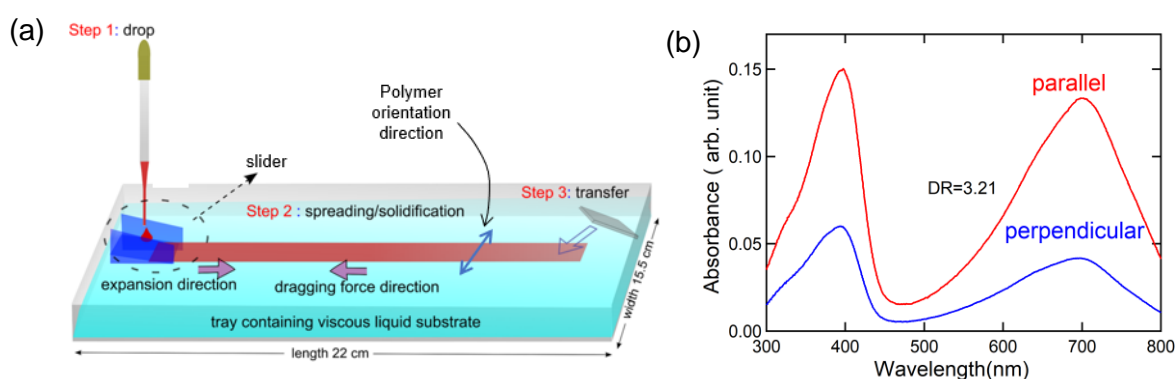


Fig.1. (a) Schematic illustration of UFTM with polymer orientation direction. (b) Polarized absorption spectra of N2200 films prepared using UFTM.

References:

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