Optical properties of \(\pi\)-conjugated polymer Langmuir-Blodgett film

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Langmuir-Blodgett (LB) technique is a promising method to construct well-defined structure at a monomolecular level by dipping the monolayers. If one applied the technique to \(\pi\)-conjugated polymer, the \(\pi\)-conjugated polymer chain is two-dimensionally elongated. As the results, conformational defects are expected to be decreased. In such highly extended \(\pi\)-conjugated system, highly efficient optical nonlinearity will be realize.

In this study, we prepared two kind of amphiphilic \(\pi\)-conjugated, and successfully formed their LB film.

Figure 1 shows amphiphilic polymer structures employed in this study. One is consisting of sequence of thiophene having long alkyl chain and thiophene with hydrophilic ammonium group (PC18TC1). The other is consisting of sequence of fluorine chromospheres with two long alkylchains and thiophene with hydrophilic ammonium group (2C12FTC2). The polymers were formed stable monolayers on the deionized water subphase. The monolayer is easily deposited by use of LB technique; more than 40 layers were deposited on fused quartz substrates. Figure 2 shows absorption spectra of PC18TC1 and 2C12FTC2 LB film. In PC18TC1, red-shift of absorption edge is observed; i.e. \(\pi\)-conjugated system is extended. On the other hand, absorption spectra of 2C12FTC2 is well corresponded with that in chloroform, demonstrating that two-dimensional random conformation. The difference and detailed optical properties will be discussed in the poster session.

Figure 1. Molecular structures of amphiphilic \(\pi\)-conjugated polymers

Figure 2. Absorption spectra of LB films of PC18TC1 and 2C12FTC2