

Analysis of Intraocular Behavior of Nano Eye-drops by Fluorescent Nanoprobes based on FRET

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Although typical eye-drops are a convenient treatment method for ocular diseases, they have the disadvantage of low intraocular penetration. To solve this problem, nano eye-drops, which are eye-drops with enhanced intraocular penetration by making nanoparticles (NPs) of the drug, have been attracting attention.^{[1][2]} However, the pharmacokinetics of nano eye-drops are still unknown.

In this study, we aimed to analyze the intraocular penetration pathway of NPs, track the dissolution of them, and investigate the effect of particle size. We focused on fluorescence resonance energy transfer (FRET), which is available to track the dissolution behavior of NPs.^[3] We selected the 3-boryl-2,2'-bithiophene-based compounds (BBTP) because of their high fluorescence quantum yields of over 60% both in solution and in the solid state.^[4] NPs of a 9 : 1 mixture of MES-BBTP and TPA-BBTP (**Fig. 1**) were fabricated by the reprecipitation method^[5] and emitted fluorescence at a different wavelength in solution by FRET. Furthermore, it was discovered that the particle size of FRET NPs can be controlled by changing the ratio of deionized water and THF used as the poor solvent in the reprecipitation method. (**Fig. 2, 3**).

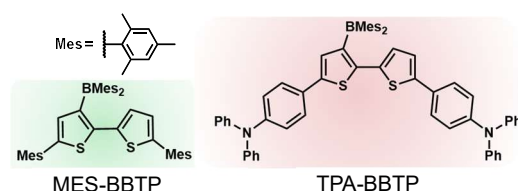


Fig. 1 Structures of MES-BBTP and TPA-BBTP

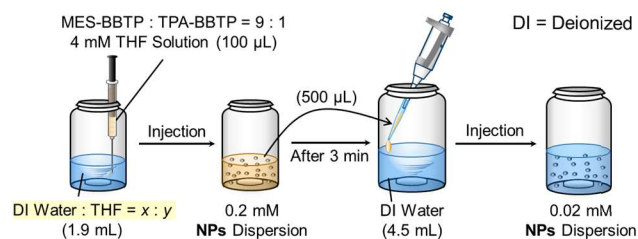


Fig. 2 Conditions for fabricating FRET NPs

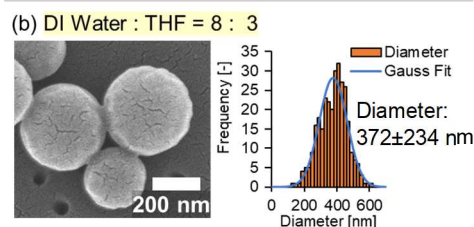
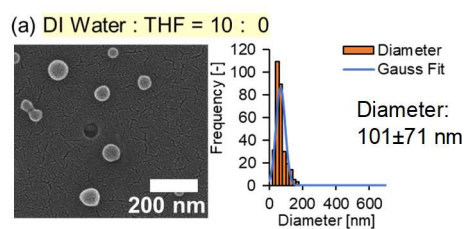


Fig. 3 SEM images and particle size distribution diagrams of FRET NPs.

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