## Development of a novel amphiphilic lophine dimer

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Lophine dimer is one of the photochromic compounds whose color is reversibly changed by photo irradiation. Upon UV light irradiation, the dimer solution is readily colorized because the dimer is cleaved into a pair of lophyl radicals. Afterwards, a thermal recombination reaction of the radical species causes bleaching of the color [1]. The coloration reaction with photo irradiation is much faster than general photochromic reactions [2]. On the other hand, the thermal decoloration reaction is much slower compared with the coloration reaction because the rate of the recombination reaction is dominated by the collision of the radical species diffusing in a solvent matrix. Recently, Abe and coworkers accomplished a rapid recombination reaction of the lophyl radicals with a synthetic approach [3][4]. In this case, in order to inhibit the diffusion of the photogenerated radical species, two lophine units in the structure are covalently bonded with naphthalene, cyclophane, or benzene moieties. From this finding, we assumed that if a lophine dimer was solubilized in micelles formed by surfactants, the recombination reaction was accelerated because the distance between the radical species could be shorter than that in a solvent. In previous study, we have tried an acceleration of a recombination reaction of the lophyl radicals in a nano-cage formed by micelles. In this result, the decoloration rates of the lophine dimer derivative bearing alkyl chains as solubilizing groups were accelerated about 100 times in CTAB aqueous solution compared with those in organic solvents. In this study, we have synthesized a novel amphiphilic lophine dimer for further acceleration of the decoloration rate of the lophine dimer and for expanding application of a lophine dimer.

A novel amphiphilic lophine dimer bearing quaternary ammonium salt as hydrophilic groups (N-C6-LPD) was synthesized with 4 steps. In the step 1, bromohexane was introduced to 4-hydroxybenzaldehyde by a Williamson ether synthesis. In the step 2, the lophine derivative was synthesized from the obtained compound in the step 1. In the step 3 and 4, the lophine derivative was dimerized and quaternary ammonium salt was introduced as hydrophilic groups. The structure of the obtained compounds was determined by <sup>1</sup>H-NMR and ESI-MS. We will also demonstrate the photochromic and interfacial properties of N-C6-LPD in the poster session.



Figure 1 The structure of N-C6-LPD

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