나노 피브릴상을 갖는 형광유기젤 이온 센서

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Fluorescent Organogel with Nano-fibrilized Structure for Ion Sensor Application

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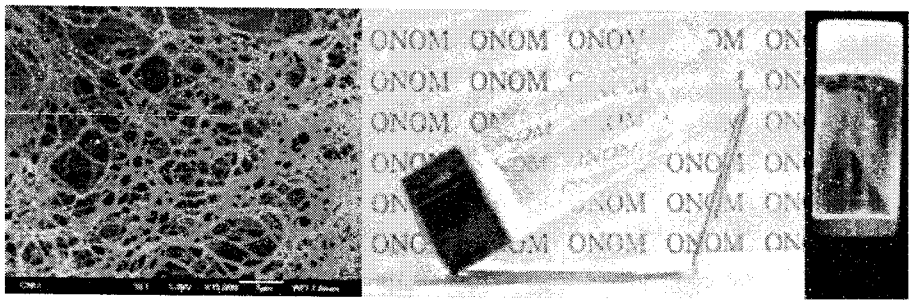
Supramolecular structures composed of low molecular mass molecules have attracted much interest due to their unique characteristics and potential applications as templates of nano-scale inorganic materials,[1,2] organic soft materials,[3] and optical sensors.[4] Supramolecular structures can be obtained by self-assembly from completely dissolved low molecular mass molecules in organic media, and exhibit nano-scale phases such as fiber, ribbon, and disk-like structures.[5] Gelation is an intriguing phenomenon demonstrated by small molecules in aqueous or organic solvents resulting from weak secondary interactions, leading to the formation of supramolecular structures of nanometer to micrometer dimensions.[6] Self-assembled gelation for supramolecular structure is organized by intermolecular physical interaction facilitated by hydrogen-bond and other subsequent weak interactions such as π-π interaction of heterocyclic rings, van der Waals force of long alkyl chains, and electrostatic forces.[7]

In this study, we designed a low molecular mass molecule including sensory fluorescent parts for construction of organogel. The fluorescent molecule, hydroxyphenylbenzoxazole, was linked with long alkyl chain by urea linkage. When low molecules, after dissolving in organic media by heating, were cooled down to room temperature, a fluorescent organogel was formed. To confirm the sensing properties of organogel, variety anion species were added into organogel, and then the optical and physical changes were observed. The self-assembled structures and optical properties were confirmed with SAXS, FE-SEM, UV-vis and fluorescence spectroscopy. The FE-SEM image reveals that low molecule was self-assembled with three-dimensional networks composed of fibrilized nano-structure (Figure 1). Furthermore, the absorption and emission maxima of organogel were blue-shifted compared to those of solution. The anion sensing properties of organogel were confirmed with UV-vis and fluorescence spectroscopy. By addition of fluoride anion into organogel, the absorption and emission maxima were shifted and quenched, and gel-structure was collapsed immediately.



(a) (b) (c)

Figure 1. FE-SEM image of freeze-dried gel from tetrachloromethane (a); photographs of gel (b) under ambient light; and (c) under UV light.

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