Engineering of Thermoresponsive Polymeric Hydrogels for Fluorescent Color Switching by FRET Distance Modulation

배진우, 박찬호, 이준혁, Kin Liao[1], 김범준†
한국과학기술원; [1]Khalifa University
(bjkim02@kaist.ac.kr†)

A hydrogel has attracted significant interest in chemical and biomedical field due to the high degree of freedom for shapes, portability, and workability. In this study, we developed a hydrogel-based fluorescent thermometer using organic dyes labeled temperature-responsive copolymer system. N-isopropylacrylamide (NIPAAm) was chosen as a thermally-responsive spacer between green and red emitting dyes in order to make conformational change by temperature, while randomly polymerized acrylates were used to regulate water swelling ratio of the hydrogel. The spatial proximity of Förster resonance energy transfer (FRET) between donors and acceptors incorporated in the hydrogel can be tuned via thermo-induced collapsing and swelling of the platform at the lower critical solution temperature of NIPAAm, leading to the facile modulation of FRET efficiencies. In addition, our hydrogel system showed excellent signal-to-noise ratio and reversibility, indicating an ideal platform for biological and environmental applications. The detailed behavior of our system was investigated using photoluminescence and microscopy measurements.