Light-Sensitive Melanin-Embedded Hydrogel Actuators by Photothermal Effect

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The stimuli-responsive polymer is a polymer that reacts to external stimuli such as pH, magnetic field, temperature, and light. Stimuli-responsive polymers have been actively studied in fields such as drug delivery, tissue engineering, and soft sensors. In this study, a light-sensitive hydrogel actuator was prepared by hydrogel bilayer film consists of a melanin nanoparticle (MNP) embedded passive layer which does not react with temperature and an active layer which consists of poly(N-isopropylacrylamide, PNIPAM). When the film is exposed to UV light, MNP generated heat by photothermal effect. Subsequently, the heat is transferred to PNIPAM resulting in shape changing. Finally, selective actuation of film was demonstrated by shining the UV light locally.