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CROWN ETHER-BASED MOLDABLE SUPRAMOLECULAR GEL WITH UNUSUAL MECHANICAL PROPERTIES AND CONTROLLABLE ELECTRICAL CONDUCTIVITY BY CATION-MEDIATED CROSS-LINKING

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Since typical supramolecular gels do not possess electrical conductivity due to wide band gap of the low-conjugated gelator molecules and long distances between the gelators by large amount of solvent in the gel network, their practical use in application fields has been largely limited. Here, we describe high enhancement of mechanical, electrical conductivity and vibration isolation properties of supramolecular gel derived from low-molecular building blocks by incorporation of Cs^+, as additional conductive filler. The high elasticity supramolecular gel was produced by hydrazone reaction between calix-[4] arene and 18-crown-6 based building blocks, which have mechanically strong and able to molded into free-standing objects. By controlling the concentration of electron fillers in supramolecular gel, we were able to tune the mechanical and the electrically conductive properties. The supramolecular gel exhibited significantly enhanced storage and loss moduli upon addition of Cs^+, respectively. Also, the electrical conductivity of the supramolecular gel increased in proportion to the amount of Cs^+ in the gel network. These dramatic enhancements were due to effective complex formation with a sandwich structure between18-crown-6 moiety of building block 2 and Cs^+. We also evaluated the ability of vibration isolation of the supramolecular gel. When the mechanical vibrator was turned on, the glass bead directly contacted with slide glass started to vibrate with roll, in contrast, that on supramolecular gel kept its position without any movement. We expect that the concept of embedding electron fillers within self-assembled material will open up new possibilities for developing soft materials with unusual functions.

Biography

Yeonweon Choi received the PhD Degree in Chemistry from Gyeonsang National University. At present, he is working as a Researcher in Professor Jong Hwa Jung's laboratory. His research interests include supramolecular gels and their application.

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