Red-light-responsive Supramolecules based on Host-guest Interaction between Tetra-ortho-methoxy-substituted Azobenzene and β-cyclodextrin: Design and Application

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Tetra-ortho-methoxy-substituted azobenzene (mAzo) is famous for the trans-to-cis isomerization induced by red light (λ=625 nm) irradiating, while the cis-to-trans isomerization can be induced by heating or blue light (λ=470 nm) irradiating[1]. We reported a novel red-light-responsive supramolecule based on the host-guest interaction between mAzo and β-cyclodextrin (β-CD)[2]. trans mAzo is able to form a supramolecular complex with β-CD spontaneously in water. Red light induces the trans-to-cis photoisomerization of mAzo and further the disassembly of the supramolecular complex (Figure 1 (a)). Based on the red-light-responsive supramolecule, red-light-responsive hydrogels (Figure 1 (b)) and mesoporous silica nanoparticles (Figure 1 (c)) were prepared for the red light induced delivery of biomacromolecules and drugs[3].

Figure 1 (a) Red-light-responsive supramolecules formed between mAzo and β-CD; (b) Red-light-responsive supramolecular hydrogels for red light induced delivery of proteins; (c) Red-light-responsive mesoporous silica nanoparticles for red light induced delivery of doxorubicin (DOX).