Relocation of a Small Molecule in a Biocompatible Supramolecular Gel Probed by Fluorescence

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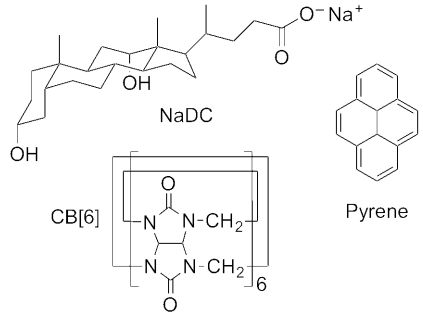
Sodium deoxycholate (NaDC) forms thixotropic supramolecular gels, which can bind hydrophobic guest molecules. In solution, NaDC forms aggregates that also provide binding sites for hydrophobic guests. Our objective was to characterize the mobility of the NaDC gel components at different temperatures.



The gel network is formed from NaDC aggregates, but some of these aggregates remain soluble in the trapped aqueous phase of the gel. Pyrene was used as a fluorescent probe molecule, which is hydrophobic and is solubilized within the gel. Cucurbit[6]uril (CB[6]), a macrocyclic host, was added to mechanically strengthen the gel and also served as a host for the weak binding of pyrene. Steady-state and time-resolved fluorescence studies showed that at low temperatures pyrene was located in the aqueous phase of the gel and bound to CB[6], whereas pyrene relocated into the network of the gel as the temperature was raised. Hysteresis was observed during cooling which led to the release of pyrene at low temperatures. The release temperature for pyrene was dependent on the concentration ratio between NaDC and CB[6]. Changes in the type and concentration of salts for the NaDC gel in the absence of CB[6] showed that after the gel was formed the presence of salts induced changes in the structure of the gel that is reflected in the gel's properties. These results show that the relocation of a small hydrophobic guest, akin to a drug, can be induced by the as additional of additives and changes in temperature.

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