

Figure S1. The absorption spectrum of avobenzene in solvents with increasing dielectric constant (Table 1).

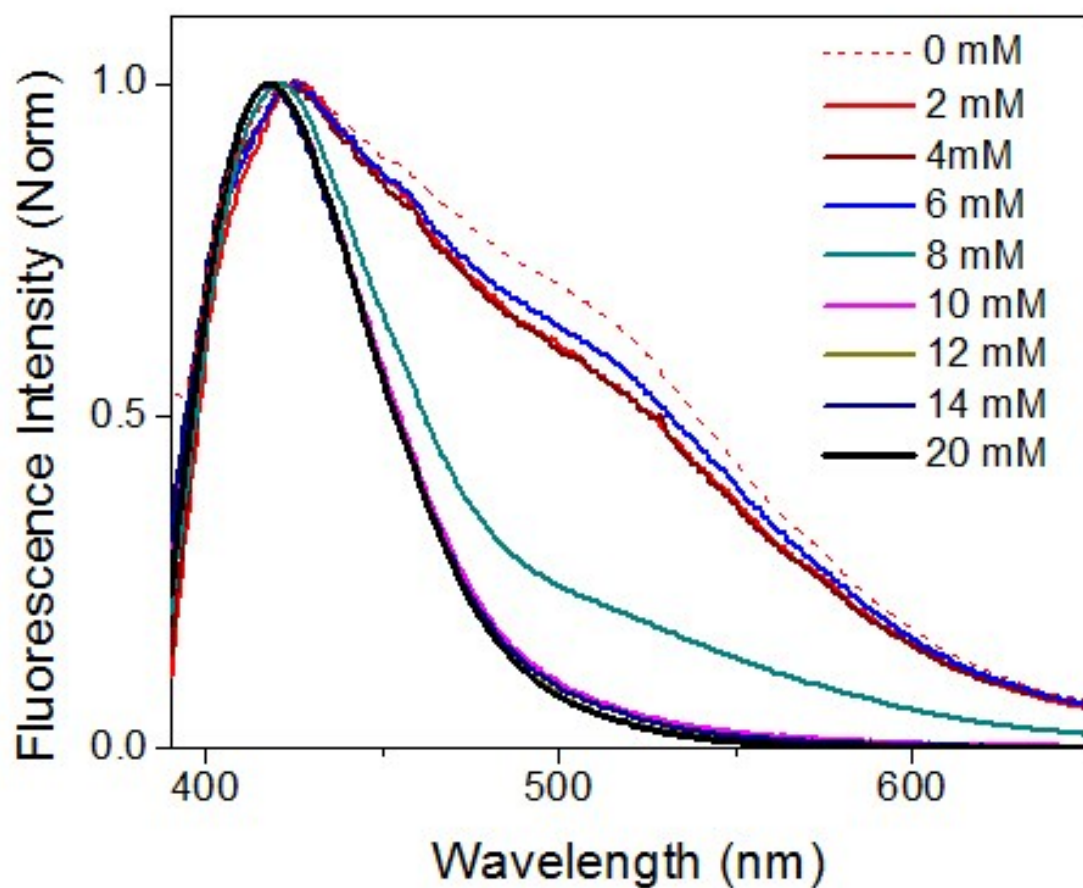


Figure S2. Fluorescence spectra of avobenzene in increasing concentration of SDS. The broad peak at 430 nm disappears at concentrations above the CMC at 8 mM SDS when the molecule is solubilized into the micelle.

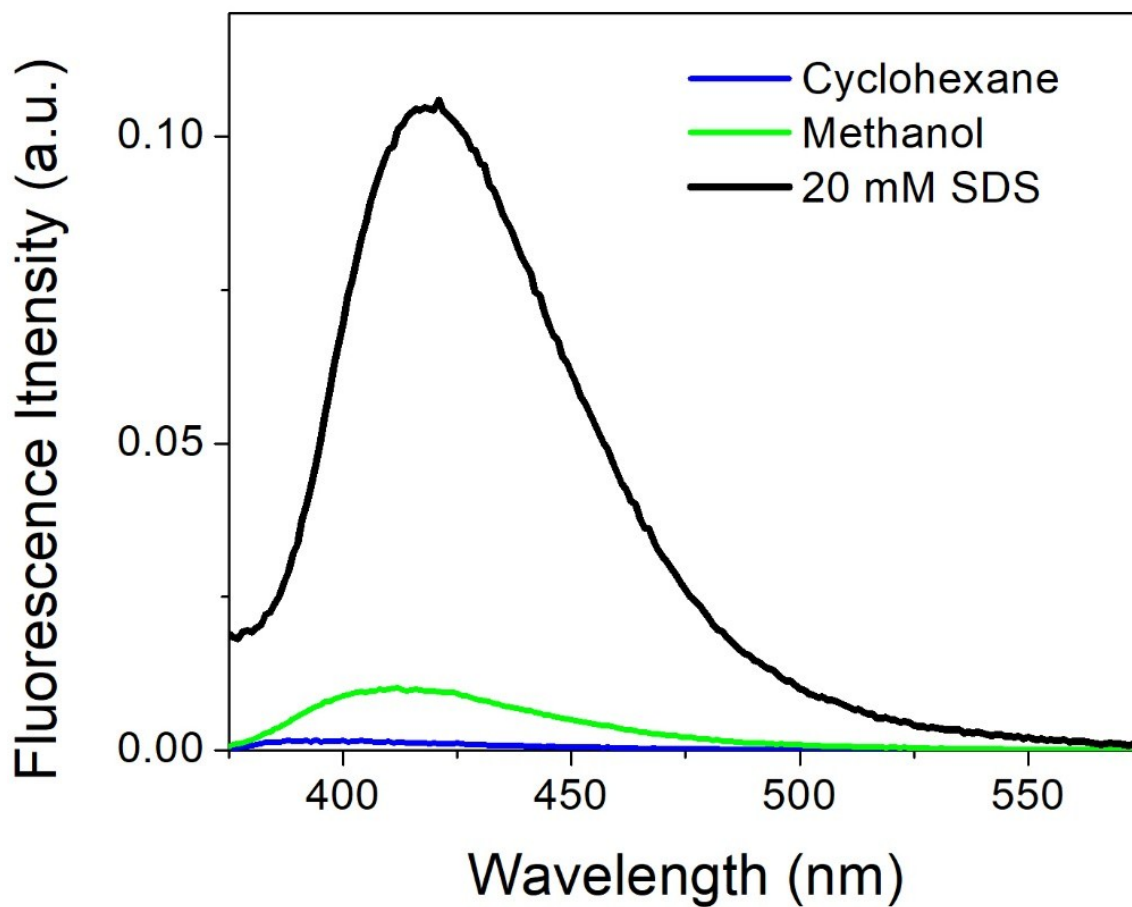


Figure S3. Fluorescence spectra of avobenzene in cyclohexane (blue), methanol (green) and 20 mM SDS (black). The spectra were corrected for differences in absorption and then integrated to calculate the area under each spectrum: cyclohexane = 0.11, methanol = 6.3, 20 mM SDS = 65.2.

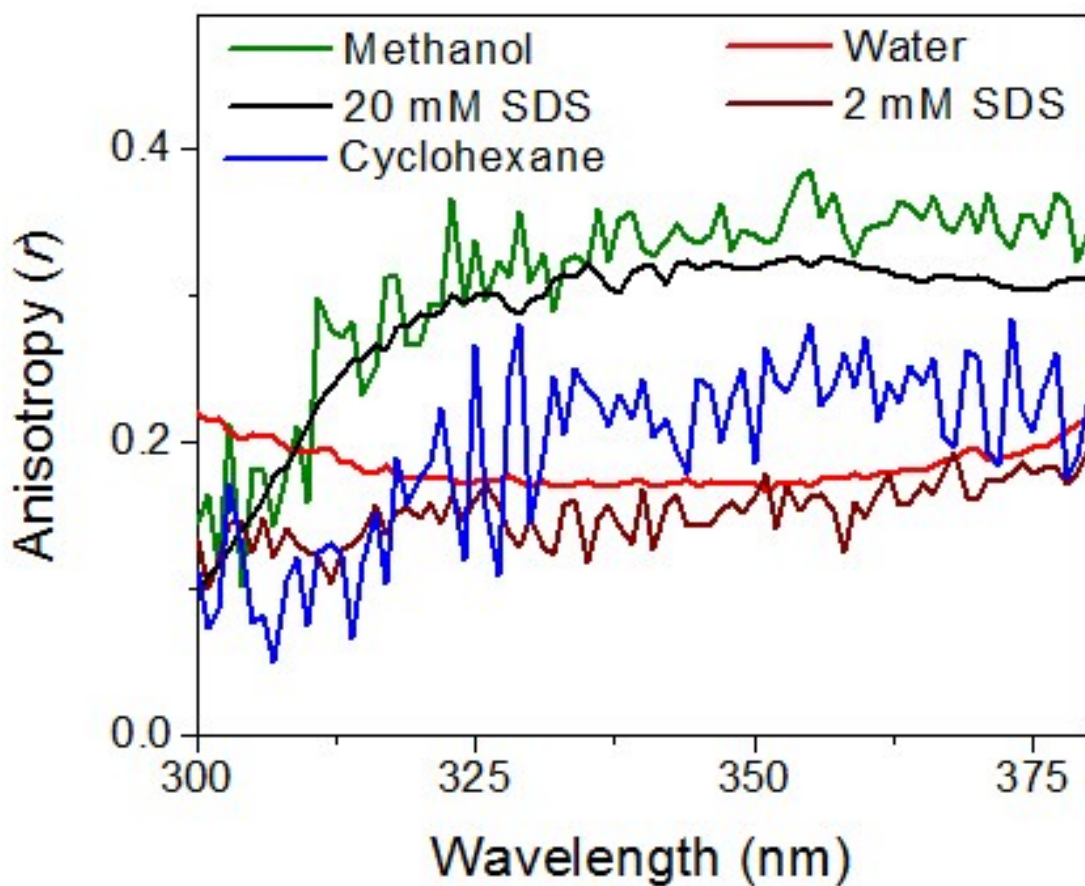


Figure S4. Excitation anisotropy of avobenzone in methanol (green), 20 mM SDS (black), cyclohexane (blue), water (red), and 2 mM SDS (brown). The data illustrate that the molecule is solubilized in micellar SDS and most likely encapsulated near the hydrophilic polar head-group of the surfactant rather than within the hydrophobic core.

The Perrin equation relates the fluorescence lifetime (τ_f) to the rotational correlation time (φ) to the steady-state anisotropy (r) of a molecule,

$$r = \frac{r_0}{1 + \frac{\tau_f}{\varphi}}$$

where r_0 is the initial anisotropy right after excitation, which is 0.4 for a typical dipole-allowed transition. This equation can be used to interpret the experimental anisotropy and fluorescence lifetime data of **AV** in micelles. In order for $r \sim r_0$, the condition

$$\frac{\tau_f}{\varphi} \ll 1$$

must be fulfilled. In methanol the τ_f is estimated to be on the order of 1-2 ps, about 10× shorter than any known value for φ .³⁰ For **AV** in micelles, τ_f is longer than in methanol and the only way that this condition can be fulfilled is if the molecule has a larger rotational correlation time φ . As stated in the main manuscript, we attribute the longer φ in the micelles to 1) the heterogeneous hydrophobic/hydrophilic environment in the micelle, and 2) the possible association of hydrogen-bonded solvent molecules that create a larger supramolecular complex that rotates more slowly. A direct measurement of φ would be desirable in order to confirm this hypothesis.

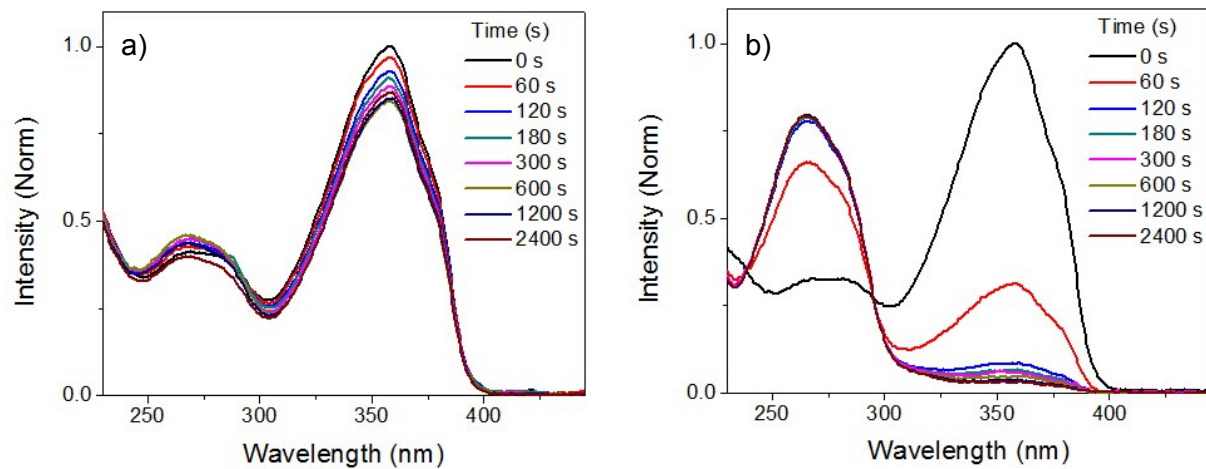


Figure S5. The absorption spectrum of avobenzene as a function of increasing solar-simulated UV irradiation in a) acetonitrile + 1% water and b) dry acetonitrile.

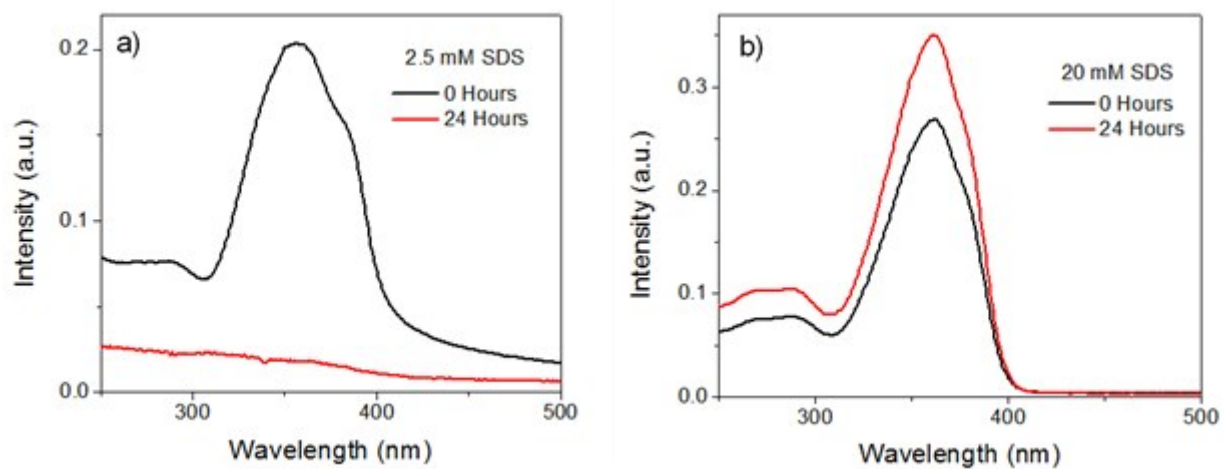


Figure S6. Absorption spectra of avobenzone in 2.5 mM SDS (a) and 20 mM SDS (b) either freshly made (black line) or after 24 hours in the dark (red line).

