S1: Additional emission spectroscopic data

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{SI_SDC_encapsulated_HBC_in_H2O.png}
\caption{SDC encapsulated HBC in H$_2$O}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{SI_SC_encapsulated_HBC_in_H2O.png}
\caption{SC encapsulated HBC in H$_2$O}
\end{figure}


S2: Additional absorption spectroscopic data
S3: Excitation vs. emission plots (enlarged version from the manuscript)
S4: Time correlated single photon counting (TCSPC) data

In order to acquire composition data of the HBC/surfactant solutions, fluorescence lifetime measurements were conducted with an 403 nm excitation pulse at 525 nm emission wavelength. All data follows a triexponential decay.

**fit parameters SDC:**

\[ \tau_1 = 33.8 \text{ ns (39.4 \%)} \]
\[ \tau_2 = 4.7 \text{ ns (36.0 \%)} \]
\[ \tau_3 < 1 \text{ ns (24.6 \%)} \]
**fit parameters SC:**
\[ \tau_1 = 15.2 \text{ ns (29.1 \%)} \]
\[ \tau_2 = 3.5 \text{ ns (47.8 \%)} \]
\[ \tau_3 < 1 \text{ ns (23.4 \%)} \]

**fit parameters SDBS:**
\[ \tau_1 = 9.2 \text{ ns (39.8 \%)} \]
\[ \tau_2 = 2.5 \text{ ns (41.7 \%)} \]
\[ \tau_3 < 1 \text{ ns (18.5 \%)} \]