Design of stable fluorescent nanovesicles for bioimaging and sensing

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Some of the most critical features of nanoprobes for bioimaging and sensing applications are their brightness, morphological homogeneity, and colloidally stability in water and biological fluids. Quatsome nanovesicles, composed of quaternary ammonium surfactants and sterols, exhibit high structural homogeneity with sizes in the range of 30-100 nm and colloidal stability over years [1-3]. These nanovesicles are ideal scaffolds for loading lipophilic fluorescent dyes, yielding highly photostable colloidal dispersions [4] with excellent performance in *in vivo* bioimaging in mice [2]. Quatsomes containing a pair of carbocyanine dyes undergoing FRET have been shown to exhibit a very high brightness ($B = 7 \times 10^7\ M^{-1}\ cm^{-1}$), and a particle-to-particle variation in brightness that is mostly below 10% [5,6]. Through the functionalization with fluorescent DNA probes, a highly selective, ratiometric detection of clinically relevant microRNAs was achieved, with sensitivity in the low nanomolar range [7].

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