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Illuminating Chemical and Biological Interfaces with Plasmonics

Surface enhanced Raman scattering (SERS) provides detailed vibrational spectra of molecules near plasmonic nanostructures. SERS has been developed primarily as a sensing platform, but can also serve as a powerful probe of chemical interfaces. The spatial decay of the electromagnetic enhancement responsible for SERS can provide structural information in addition to the vibrational fingerprint. Here we displace the surfactant at the nanorod surface with lipids, enabling SERS analysis of biomembrane structure. The lipids are shown to form natural bilayers through detection of their phase transition at the appropriate temperature. We have found that the surface-bound lipid bilayers undergo a structural transition away from the bilayer state under certain conditions, which could impact nanoparticle-membrane conjugates for nanomedicine. Recent results on nanorod surface conjugation with triazoles for neurotransmitter detection will also be described.

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