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An Enhanced Platform for Bioelectrochemical Systems: A Novel Approach to Characterize Lipid Structure on Graphene[1] MEGAN FARELL, MAXWELL WETHERINGTON, JOSHUA ROBINSON, MANISH KUMAR, The Pennsylvania State University — Graphene is a two-dimensional material composed of a single carbon layer that offers several appealing properties including high conductivity, large surface area, and flexibility. Its unique properties make graphene an ideal substrate for several applications, including energy storage, optical electronics, and medical devices. Functionalizing graphene with a lipid bilayer both increases its biocompatibility and provides a platform for diverse bioelectrochemical systems. However, characterization of lipids on graphene is challenging since traditional fluorescent methods for characterization of supported lipid structures are ineffective on graphene due to its highly quenching nature. Furthermore, there are multiple conflicting models published for the structure of lipids on graphene. We demonstrate that a novel technique using Raman spectroscopy and photoluminescence (PL) allows for characterization of lipids on graphene while providing additional benefits over conventional setups. We use Raman-PL in conjunction with liquid-AFM and QCM-D to determine the structure, fluidity, and homogeneity of lipids on graphene.

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