Centuries ago sailors observed that spreading oil on the ocean water calmed the seas. Experimental studies of the behavior of oil on water dates back to oil-drop experiments Benjamin Franklin who reported to the Royal Society in 1774 that placing as little as one teaspoon of oil on the surface calmed the ripples on a small area that quickly extended to have an acre. The knowledge that Franklin sought in those early experiments are not so dissimilar to what we still seek today. Recently there has been an upsurge in interest in the molecular properties of this interface because of its growing importance in a range of areas such as environmental remediation and oil recover technologies, nanoparticle assembly, enhanced organic synthesis, and for its value as a model system for understanding more complex biomolecular behavior. In this presentation I will give an overview of what we have learned from our combined experimental and computation approach about the intrinisic molecular properties of this interface and how it provides a unique platform for ordered assembly surfactants, macromolecules and nanoparticles.