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Vibrational Studies to Elucidate the Structure of Water at Biological Interfaces BAHAR BAHRANI, University of Saskatchewan, LUKE O'NEILL, KUNAL BHATTACHARYA, HUGH BYRNE, Dublin Institute of Technology- Focas Institute, DUBLIN INSTITUTE OF TECHNOLOGY- FOCAS INSTITUTE TEAM — In biological systems, water takes up to 80% of the volume inside a cell. This water solubilises the biological macromolecules such as the DNA, proteins and lipids. Recent advancements have shown that the water at the interface of a lipid is structured, five layers of structured water have been found at this solvent cage. Steady state spectroscopy, FT-IR and Raman vibrational, of water in lipids was performed in an attempt to elucidate the structure of water at the biological interface. Raman spectroscopy was used to probe the difficulties of observing the vibrational signature of the water molecule at low hydration limits. Dehydration was hindering as water molecules in the air constantly rehydrate the lipid, thus preventing it from reaching the low hydration limits desired. Deuterium Oxide proved to be an unstable molecule, which mixes with water molecules in air to produce a three-parameter system contained of the two aforementioned isotopes of water and Hydrogen Oxygen Deuterium, when it is used under an uncontrolled atmosphere. It also showed itself to be toxic to cells when introduced quickly and at high concentrations. It was evident that lipid and water must be examined under controlled environmental conditions or under an inert gas, in a search to look for structured water.

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