- **CO2 Capture by amine absorption**
- **Density gradient theory for interfacial tension calculations**
- **Direwaves – Disarming resistant microbes with resonant waves**
- **KARAKALK**
- **Scale thickness prediction using extended UNIQUAC**
- **WATERSTRUC - Structured Water and its Implications for Biology, Chemistry and Physics**

WATERSTRUC - Structured Water and its Implications for Biology, Chemistry and Physics

Water close to surfaces and water-based substances such as biofilm can have liquid crystal properties.
Water itself can form macroscopic structures, similar to ice but in a liquid state. Such structures can cause particle and charge separation.
This multidisciplinary project will study aqueous liquid crystals and their response to electromagnetic fields and other stimuli.

Liquid water can form large self-organized ice-like structures around ions and particles as well as close to surfaces. There is strong evidence for two states of liquid water – low and high density water (LDW/HDW) [1]–[3]. Experimental evidence shows that particle-free zones can extend up to hundreds of microns from surfaces [4], [5]. Water structures are also proposed to form coherent domains [6]. Structured water is proposed as an intermediate phase between liquid water and ice [7]. Such water separates charge, creating a “water battery” that can produce electrical current, driven by infrared light [8]. Spontaneous water flow driven by infrared radiation has been observed in narrow hydrophilic tubes, an effect that can add to the understanding of transport in biological systems [9]. A pH gradient has also been reported [10].
Polarized light microscopy shows birefringency properties in living tissue [11] and biofilm [12], indicating liquid crystallinity in living organisms [11], [13], [14]. Biological liquid crystals are often attributed to proteins. However, the importance of water has likely been underestimated.
A key question of this project is: Can water itself form macroscopic long-range liquid crystals and what would the implications be for the natural sciences?

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