UNIVERSITY OF CAMBRIDGE

December 2023

The Maxwell Centre at the University of Cambridge: Primary Research Results on Groundbreaking TeraWater

Our scientific cooperation with the TERA, a company based in Israel, continues to provide new insights on the remarkable properties of TeraWater.

The collaboration is focused on characterizing the physics of the material and interfacing doped water to the electronics industry. The need for this fundamental liquid state physics work has been overlooked by industry due to engineers trying to purify solid electronic materials, rather than embracing water head on.

Understanding and adapting methods to measure its electrical and mechanical behavior will fill this knowledge gap. These scientific discoveries conducted with high precision will support the engineering of the correct interfaces to TeraWater, which will in turn impact energy, sustainability, agriculture and medical sectors.

So far, we have set up a lab to study this type of novel water over a wide electromagnetic spectrum including THz. First the Cambridge team needed to see for themselves whether TeraWater was physically different from normal water. The team subjected the material to dielectric spectroscopy (40GHz), ISCAT, dynamic light scattering, low level acoustic QCM-D (10-100MHz), high level SAW, including refractive index and contact angle measurements. All measurements, apart from refractive index, showed TeraWater was physically different which classically, with low level nanoparticle at mineral water concentrations, the physical measurements should not perceivably be altered at all. It was behaving like a doped semiconductor.

To follow up on this opportunity, which came with an excited note to the team in Dec 2023, we serendipitously found how to get electrical energy over very wide frequencies efficiently into water. It is an approach that substantially reduces interfacing complexities that may have slowed us down and has not been reported in the literature yet. With this barrier gone, the frame for producing geometries around acoustic, optical and THz water devices can now be investigated in detail. In step with this progress, we are now primed to complete a first of its kind water core optical fiber for ultra precise interferometry measurements.

To summarize, during this year we have established a much better understanding of the path to interface TeraWater to electronics industry needs, how to make precision water measurements which could help understanding of TeraWater by our peers, and importantly have confirmed there is physical evidence of water doping phenomena established by TERA's CTO, Eran Gabbai.

A. Stevenson

_____

Dr. Adrian Stevenson
Department of Engineering
Energy, Fluids and Turbomachinery Division