Nonlocal quantum phenomena in macroscopic systems: 1k replication experiments with Electrochemical Impedance Spectroscopy in water

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Recently, a number of high-level scientific publications point to possible observations and measurements of quantum phenomena appearing in macroscopic systems [1]. Such phenomena are also well-known in the water research. For instance, the results of Electrochemical Impedance Spectroscopy (EIS) are affected by several environmental parameters (such as temperature, mechanical distortions or light) and electrochemical parameters of fluids (e.g. the ionization constant, number and mobility of ions). However, not only macroscopic but also microscopic parameters impact the measurements. This is related to the processes of self-ionization (dissolving the water molecules on H_3O^+ and OH^- ions), the proton tunneling effect and change of configurations in molecular clusters of H_2O [2]. The self-ionization of water molecules happens due to fluctuation of electric fields, having quantum origin [3] (among other effects). Proton tunneling effect is well-known, it was first discovered in 30s of XX century and explains cases of anomalous conductivity of water [4]. These quantum effects happening on the micro-level between water molecules, ions and protons, cause changes of fluidic parameters on the macro-level, which can be in turn measured by EIS as changes of magnitude and phase of complex impedance in time-frequency domains. These parameters also impact the biochemical reactions in organic tissues.

Two quantum systems can be considered in telecommunication terminology as ‘receiver’ and ‘transmitter’ with possible nonlocal entanglement between them. Current experiments on the Micius satellite demonstrated the quantum teleportation of entangled photon pairs at the distance of 1400 km**.** The nonlocal entanglement is possible not only between microscopic but also between macroscopic objects, such as 3mm diamonds at the distance of 15 cm [5]. The expressed in 80s research hypothesis proposes that water systems, as a transducer of quantum effects to macroscopically observable parameters, can be utilized as a general-purpose “nonlocal biochemical information transmission” system with several “wave-function collapse” or “quantum decoherence” effects. Experimental investigation of this hypothesis started in pioneer works of V.A.Sokolova, A.V.Bobrov, S.N.Maslobrod, A.F.Ohatrin, E.A.Akimov and others by measuring electrochemical, biochemical and biophysical properties of pairs of involved water systems. Up to now over 1000 nonlocal experiments have been performed, documented and published. Long-range nonlocal experiments based on entanglement in macroscopic systems are currently performed between European countries, USA, Russia, China, India and Australia (with about 14000 km of the maximal distance in pairs of entangled objects). High sensitivity of EIS devices (up to 10^{-9}-10^{-11} S/cm and 10^{-3} degree of phase) enables a reliable detection of nonlocal events (up to 85%-93% of true detection). There exist even online services that plot results of nonlocal EIS measurements in real time in web.

In the presentation, the scientific background of such experiments will be shortly discussed. The historical works, the already published results and modern EIS setups used in these attempts will be demonstrated. The performed scientific research (only USSR invested about $0.5-1 billion in this RTD) is arrived at the stage of innovations. In particular, the technology of Information Copies (IC) between biochemical substances and water systems will be introduced. The presentation will shortly demonstrate several achieved so far real-world applications in information pharmacology, long-range telecommunication, agriculture, metallurgy, and polymer production areas.

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[4] Bockris, Modern Electrochemistry: An Introduction to an Interdisciplinary Area, Springer Science, 2012.
[5] Lee et al, Entangling Macroscopic Diamonds at Room Temperature, *Science,* 334 (6060), 1253-1256, 2011.