

## Mechanisms of storing energy and information in water

The discovery of the way of formation of mixed coherent domains (mCDs) of water, thanks to the Zhadin effect (2006) [1], allowed progress in revealing mechanisms of storing, that are acting in water.

Energy: From QED we knew that absorbed quanta in water with energy lower than 12,06 eV - not exploitable for electron transition from the ground state to the first excited state of water molecules - should be stored in the quasi free electrons, coming from the excited molecules belonging to the CD and forming clouds around the domain (1995) [2]. These clouds undergo toward a coherent stage in order to minimize energy, releasing the surplus energy to ions previously captured and now escaping from the coherent domain (2009)[3], in the same way as under the Zhadin effect (1994)[4].

Information: A mCD arises when an ion or a zwitterion in aqueous solution is captured by a pure water CD, thanks to the strong gradient of electromagnetic potential vector between the interior of the CD and its boundary [5]. But only ions can be captured, whose infrared spectrum shows a line close to the line of water spectrum at 0,4 eV, by resonance. Other ions cannot. Others are hydrophobic ions (all) and some kind of hydrophilic ions (not all), as well. We can name them non-bio ions. Close to surfaces, thanks to the additional energy of tips and to the lattice of the material, CDs become quasi-stable (2006 Jan) [6]. Hence the improper notion of EZ water (2006 Nov) [7], since non-bio ions are excluded by the zone close to surfaces, where coherent domains form a clear, not perfused strip. All other ions - that we name bio-ions- are captured by coherent domains! As a matter of fact, they disappear, since their oscillation frequency is modified by resonance in order to tune the frequency of oscillation of nucleuses of water molecules. Indeed, water molecules in a CD are in the order of millions and their oscillation is slightly influenced by the oscillation of the captured ion, while this latter is strongly influenced so that it assumes the own oscillation of nucleuses of water. Moreover, their chemical properties disappear as well. When a suitable energy is provided – naturally, from electron clouds of the CD or artificially as in Zhadin effect, they escape from CDs (2002) [8] and they achieve again their chemical identity in bulk water. When they are captured in CDs they cannot be diluted as easily as in bulk water. Concentration in the coherent fraction of water does not decrease linearly as it decreases in bulk water - the incoherent fraction of water. Thus after many dilutions, there are still molecules of solute ions in mCDs that can escape from CDs into bulk water, when suitable conditions occur. That is experienced by Montagnier L and coll. (2009) [9] and in several other works. A concurrent mechanism is the action of Schumann waves that are able to protonate water, matching the ion cyclotron resonant frequency of H<sub>3</sub>O<sup>+</sup>-hydrates. As we experienced (2014)[10], Schumann frequencies induce in water a modification, stable in the order of hours, that enables water to work as an amplifier of all signals in the range of ELF/ULF. Thus, water becomes able to reveal even tiny ion currents, i.e. signals coming from the few ions that escape from CDs and flow in bulk water, where all other signals have been suppressed by dilutions. Hence, the impression that water had a memory, since the escaped ions exhibit again their chemical properties.

## REFERENCES

- [1] Zhadin MN, Giuliani L. *Some Problems in Modern Bioelectromagnetism*. Electromagn Biol Med. 2006; 25(4):227-43
- [2] Preparata G. *QED Coherence in Matter*. World Scientific, Singapore, Hong Kong, New Jersey, London 1995
- [3] Del Giudice E, Tedeschi A. Water and autocatalysis in living matter. Electromagn Biol Med. 2009; 28(1):46-52. doi: 10.1080/15368370802708728
- [4] Zhadin MN, Novikov VV, Barnes FS, Pergola NF. *Combined action of static and alternating magnetic fields on ionic current in aqueous glutamic acid solution*. Bioelectromagnetics. 1998;19(1):41-5
- [5] Del Giudice E, Giuliani L. *Coherence in water and the kT problem in living matter*. In Giuliani L and Soffritti M. *Non-Thermal Effects and Mechanisms Of Interaction between Electromagnetic Fields and Living*

Matter. Eur. J. Oncol. Library 2010, 5:7-23. Mattioli 1885 Fidenza 2010 Oct. Isbn 978-88-6261-166-4 (free download @ <http://www.icems.eu/papers.htm>)

- [6] Comisso N, Del Giudice E, De Ninno A, Fleischmann M, Giuliani L, Mengoli G, Merlo F, Talpo G. ) Dynamics of the ion cyclotron resonance effect on amino acids adsorbed at the interfaces. Bioelectromagnetics. 2006 Jan;27(1):16-25.
- [7] Zheng JM, Chin WC, Khijinak E, Khijinak Jr E, Pollack GH. *Surfaces and interfacial water: Evidence that hydrophilic surfaces have long-range impact.* Adv Colloid Interface Sci. 2006 Nov; 127(1): 19-27.
- [8] Del Giudice E, Fleischmann M, Preparata G, Talpo G. *On the "unreasonable" effects of ELF magnetic fields upon a system of ions.* Bioelectromagnetics. 2002 Oct;23(7):522-30
- [9] Montagnier L, Aïssa J, Ferris S, Montagnier JL, Lavallée C. *Electromagnetic signals are produced by aqueous nanostructures derived from bacterial DNA sequences.*
- [10] D'Emilia E, Giuliani L, Lisi A, Ledda M, Grimaldi S, Montagnier L, Liboff AR. *Lorentz force in water: evidence that hydronium cyclotron resonance enhances polymorphism.* Electromagn Biol Med. 2015;34(4):370-5. doi: 10.3109/15368378.2014.937873. Epub 2014 Jul 14.