On the relationship between
Exclusion Zones and
Coherence Domains in water

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Water is the most customary and at that the most enigmatic substance.
Our customary feeling about water – vapor: What can be softer than clouds?
Our customary experience about humidity: dry air provokes electrization, humid air prevents it.
On the other hand...

Atmospheric water may be stronger than steel.

Atmospheric water generates a lot of electricity.
Everybody knows that water extinguishes fire
**On the other hand…**

**Water may burn!**

Burning of salted (sea) water under irradiation of radiowaves (13,56 MHz, 200-400 Watt). Temperature of flame > 1500°C.

*John Kanzius, 2007*
Why water is so enigmatic?
REAL WATER is never a plain (homogeneous) substance, it is always a COMPLEX SYSTEM.

(In particular) Any water contains INTERFACIAL water and BULK water.
Interfacial water of a living individual, e.g. Jellyfish, does not mix up with bulk water.

Water content may reach > 99% by weight.
**Interfacial water in a tissue**

**BLOOD:**

~83% of water, 17% of solids.

Surface area?

5000 m² of surface of erythrocytes is hydrated by 3 liters of plasma water

If to distribute 3 liters of water on 5000 m², the thickness of water layer will be < 1 mkm.
Distance between surfaces of macromolecules and membranes in a cell does not exceed 7-12 water layers.
Thick layers of organized water form near hydrophilic surfaces

Jerald H. Pollack, experimental results of 2003-2012
The Depth of the Surface Zone of a Liquid*

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so deeply as to modify the molecular state of a skin some hundreds of microns in depth,” that is, some millions of angstroms. The accepted analysis of evidence showing that surface properties differ from those of the bulk liquid.

BIBLIOGRAPHY


Summary of properties of aqueous phase adjacent to hydrophilic interfaces (interfacial water)  
(Gerald H. Pollack et al., 2003 – 2012)

Excludes into bulk water all studied low- and high mol. weight molecules and particles -- EXCLUSION ZONE WATER (EZ-water)

EZ water is physically different from bulk water in

• Viscosity (higher)
• Structural temperature (lower)
• Self- diffusion coefficient (lower)
• Optical properties (absorption at $\lambda=270$ nm, fluorescence)
• Etc…etc…

Thus, it is dynamically organized, “liquid-crystalline”, quazi-polymeric something originated from water

EZ- “WATER” $\neq (H_2O)_n$
Unexpected finding – EZ-water is charged

EZ (interfacial)  Bulk
Up to 150 mv

Negatively charged surface
EZ- “water” may be charged negatively or positively depending on the charge of the surface forming it

EZ-water formed near NEG. bead is negatively charged

EZ-water formed near POSITIVE bead is positively charged

Charge distribution in respective EZ-water(s)
These properties of systems:

appear to contradict the general law of electrostatics:

Like charges repel
Opposite charges attract
However, we are dealing here with fixed charges

Negatively charged surface

Positively charged surface
Like charges repel each other, but as they are covalently fixed to a matrix, they all cannot but vibrate.
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Their collective vibration could become coherent due to the principle of minimization of energy
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Since the charged surface is at least 2-dimensional, fixed charges oscillate not in a planar fashion but tend to rotate.

Coherent e.m.f.

Coherently oscillating fixed charges

Solid (e.g. polymeric) backbone
Single water molecules do not “feel” EMF radiated by a charged surface immersed in water.

But any water water contains “receptors” of this field as it follows from Preparata – Del Giudice water model.
Preparata-Del Giudice model of water is based on Quantum Field Theory – the foundation of the modern physics

According to QFT all particles and associated fields cannot but oscillate. Water molecules in vapor oscillate, but independently of each other – non-coherently because of long distances between them (density is below the critical density)

\[ \leftarrow 3,6 \text{ nm} \rightarrow \]
When vapor condenses into water (temperature decreases below a threshold and density increased above a threshold), water molecules become to oscillate in phase (minimum of energy) – the condition for coherence.

Coherently oscillating water molecules get together with associated EMFs in Coherent Domains immersed in dense gas-like non-coherent water.
Quasi-free ELECTRONS accumulate at the surface of Coherent Domains

Illustration by Bernhard Pollner
Vortices of Quasi-free PROTONS concentrate at the Core of CDs

Proton - Vortices can collect & convert External Energy

Proton - Vortices can be influenced by external, (natural) EMFs
EMFs produced by negatively charged surfaces may resonate with EMF produced by oscillations of the quasi-free electrons of CDs. CDs are attracted by the charged surface due to "RESONANCE ATTRACTION"
CDs attracted by the NEGATIVELY charged surface expel quazi-free protons unable to resonate with the surface EMF and turn into negatively charged COHERENT DOMAIN.

Opposite should be true for the interaction of POSITIVELY charged surfaces with CDs.
One of many examples of Resonance Attraction principle realization in biology:

Erythrocytes behavior in blood
Erythrocytes are negatively charged. Still they actively attract each other and form “rouleau” where they are held together by coherent excitations.
Using experimental setup for TV-monitoring of erythrocyte sedimentation in whole blood we could observe Resonant Attraction (next slide)
A falling down single erythrocyte is attracted to the sludge of erythrocytes fixed on a cuvette wall after settling down the major mass of erythrocytes.
A falling down single erythrocyte is attracted to the sludge of erythrocytes fixed on a cuvette wall after settling down the major mass of erythrocytes.
Like likes Like
If they are coherent
Water is the major agent operating the principle of Like Likes Like in the Universe