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Holographic interpretation of clusters of related water in gels of iron oxyhydrate(III), yttrium and aluminum

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Abstract

The appearance of the electroacoustic echo is associated with nonlinear interactions in oxyhydrate crystallites containing giant clusters of water, so this phenomenon is a new method for studying nonlinearity in colloidal chemical systems as well.

Detection of the electro-acoustic effect in systems of the type of oxyhydrates of *d*-elements indicates the regular formation of giant polyhedral structures involving water in gel systems. These designs live in time, change.

Some electromagnetic impulse excites a package of infrasonic oscillations that propagate along the gel flooded cluster environment. With the passage of time, the electromagnetic oscillations become out of phase, that is, they become incoherent. As a result, the nonlinear interaction of this packet with the previously formed sound waves with a frequency with the electric field of the second pulse with frequency or is realized. At the same time, a new, reversed sound packet is born with a frequency equal to the frequency of the original packet and propagates in the opposite direction. This sound package creates a pulsating giant aquatic oxyhydrate cluster. That is, so-called reversed waves are born. In the reversed packet, the electromagnetic coherence of the oscillations and the growth of the amplitude of the electromagnetic package are revived at a time. The amplitude of the reversed packet becomes maximum. All this is united by the concept of "electromagnetic acoustic or phonon echo" in oxyhydrate colloidal medium.

The oxyhydrates of most *d*- and *f*-elements show pronounced ferroelectric properties, which are manifested in the appearance of a spontaneous nano-electric current in a colloidal-chemical cell. Fluctuations in the amplitude of the measured current can vary from 5-10 nA to 0.5 μA, and the amplitude of the current does not depend on the duration of the experiment. In this case, one-time strong current bursts can occur, reaching values of 0.2 μA at a background level of 5 nA. It is visually difficult to distinguish the current dependencies for oxyhydrates of various elements of iron, tin, zirconium, yttrium, etc. The time interval between pulses is 51.2 seconds.

References

[1] Yu.I. Sucharev, I.Yu. Apalikova. Claster electric spectroscopy of colloid chemical oxyhy-drate systems. *Switzerland, USA: Trans Tech Publications.* **2015**. P.585.
[2] Yu.I. Sucharev. Nonlinearity of Colloid Systems: Oxyhydrate systems. *Switzerland, UK, USA: Trans Tech Publications.* **2008**. P.433.
[3] Yu.I. Sucharev. Wave oscillations in colloid oxyhydrates. *Switzerland, UK, USA: Trans Tech Publications. LTD.* **2010**. P.497.
[4] Yu.I. Sucharev, Eugeny S.Vertsyukh. Evolution of the features of Whitney stochastic experimental streaming cluster caustics of tin(VI) hydroxide. *Butlerov Communications.* **2012**. Vol.30. No.4. P.17-24. ROI: jbc-02/12-30-4-17
[5] Yu.I. Sucharev. Emissive-wave duality of periodic behaivor in the oxyhydrate of *d*- and *f*-elements oxyhydrates. *Bulletin of SUSU, ser. "Mathematics, physics, chemistry".* **2008**. Vol.11. No.22. P.106-117. (russian)
[6] Physics of ferroelectric phenomena. G.A. Smolensky, V.A. Bokov, I.A. Yusupov, N.N. Krainik, R.E. Pasynkov, A.I. Sokolov, N.K. Yushin. *Leningrad: Science.* **1985**. 386p. (russian)
[7] B.A. Agishev, I.A. Deryugin et al. *Solid State Physics*. **1976**. Vol.18. P.1117. (russian)
[8] N.S. Shiren, R.L. Melcher, D.K. Garrad, T.G. Kazyaka. *Phys.Rev.Lett.* **1973**. Vol.31. P.819.

[9] Yury I. Sukharev, Boris A. Markov. Reconstruction of spontaneous electric current attractors in oxyhydrides of *d*-elements and phonon (or electro-acoustic) echo in colloidal systems. *Butlerov Communications.* **2017**. Vol.51. No.9. P.20-44. DOI: 10.37952/ROI-jbc-01/17-51-9-20

[10] B.A. Markov and Yu.I. Sukharev. Structures of magic clusters of oxyhydrate gels obtained by means of colloidal chemical spectroscopy. *Butlerov Communications.* **2014**. Vol.38. No.6. P.1-7. ROI:jbc-02/14-38-6-1

[11] B.A. Markov, Yu.I. Sucharev, and I.Y. Apalikova. Electroglobules, fulleroids and multipoles. Electric oscillations in oxyhydrate gels of *d*- and *f*-elements. *Butlerov Communications.* **2014**. Vol.37. No.1. P.112-123. ROI:jbc-02/14-37-1-112

[12] Yu.I. Sucharev, B.A. Markov, and O.M. Shanina. New principles of the research into imperfect crystallographic forms of colloidal chemical clusters. *Butlerov Communications.* **2013**. Vol.36. No.11. P.30-43. ROI: jbc-02/13-36-11-30