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Electroglobules, fulleroids and multipoles. Electric oscillations in oxyhydrate gels of *d*- and *f*-elements.

© **Boris A. Markov**, **Yury I. Sucharev**,*+ and **Inna Y. Apalikova**
Department of Solid State Chemistry and Nanoprocesses. Chelyabinsk State University.
Bratiev Kashirinykh St., 129. Chelyabinsk, 454000. Russia.
Phone: +7 963-460-27-75. E-mail: Yuri_Sucharev@mail.ru.

*Supervising author; +Corresponding author

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Abstract

We have obtained an equation for the electric structure of gel, conducted the self-consistency procedure for the distribution of dipoles in oxyhydrate gels, and introduced the terms macromolecular quadrupoles, octupoles, etc. Gel electric moments of higher even orders are the higher powers of the Laplace operators of orders six, eight, ten, etc. A new general ratio $j = \sum_{i=1}^{2k} \tilde{C}_i \sin\left(\omega_i x + \tilde{\varphi}_1\right)$ has been obtained, where new amplitudes and phases are obtained by adding oscillations with various phases, put down by formulas: $\tilde{C}_i \sin\left(\omega_i x + \tilde{\varphi}_i\right) = -4\pi\lambda q_0 C_i \left\{\left(\alpha_3\omega_i^2 - \alpha_5\omega_i^4 + ...\right)\sin\left(\omega_i x + \varphi_i\right) + \left(\tilde{\alpha}_2\omega_i^1 - \alpha_4\omega_i^3 + ...\right)\cos\left(\omega_i x + \varphi_i\right)\right\}$ that are described by the values of currents that in turn depend on the spatial periodic structures. In other words, we have experimentally established a relation between current j and the nanoclusters of system n.

The analysis of the experimental data suggests that, lightweight clusters the quadrupoles of which provide a relatively weak current surge with a narrow amplitude determine the principal portion of time oscillations. Alongside with those clusters, there are elements of order three, four, five, and probably six.

Nanoclusters are formed according to the "magic numbers" rule, which we established in the course of experiments.

Discontinuities in the structure of the core networks and the partial chaotization of that structure form gel defects, to which small-size mobile clusters are attracted by electrostatic or electromagnetic forces, which subsequently become absorbed and arrange on the defects in accordance with their dipole moments. This fact is determined by the values of "magic numbers."

Cluster magic structures are stratified. The internal regions of such fulleroids are formed by, e.g., medium-structured clusters and their multipoles and octupoles. If the multipoles are the like multipoles at that, this generates oscillations in the cluster flows.

The regions inside fulleroids will never be filled tightly, which will also lead to constant cluster "filling-related" oscillations, that is, oscillations related to the filling of the cluster medium with oscillations. Knowing the filling parameters of a fulleroid (that is, the oscillations), one can determine its physicochemical parameters.