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A luminous formation with a solid shell and a gaseous core

V. L. Bychkov, D. E. Sorokovykh and D. V. Bychkov

Lomonosov Moscow State University, Faculty of Physics
Bd. 2, 1 Leninskiye Gory, Moscow, 119991, Russia
E-mail: bychvl@gmail.com

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The work is devoted to luminous formations that appear in nature in various conditions such as volcanic eruptions, linear lightning strikes into the soil, in aquatic conditions during geotectonic events and other atmospheric conditions. The constructed theory explains the possibility of the formation of luminous objects in electrical devices at high overvoltages in a high-voltage circuit and during the interaction of linear lightning with a power line. Based on previous experiments, a model has been developed in the work, according to which the luminous formation is a charged sphere with a shell of atoms of soil, metals, and/or water, with an internal volume filled with a gaseous or vaporous substance. Such shells can be formed in electrical devices at high overvoltages in a high-voltage circuit, as well as when lightning discharges strike the ground containing SiO_2 and Al_2O_3 and metal objects of arbitrary composition. The internal energy is calculated during the formation of such a hot spherical object and during the transfer of charge from linear lightning. The possibility of the existence of this object with a high energy density up to 10^{10} J/m^3 is discussed.

Keywords: geotectonic events, volcanic eruption, luminous formation, linear lightning strike into the soil, high energy density, capillary discharge, long –lived luminescent formation.

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