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# Penetration of charges through the surface of water

The general goal of this project is experimental investigation of the properties of intrinsic (electric) The general problem of this project is experimental investigation of the properties of intrinsic (electric) carriers in water and development of statistics of liquid electrolytes by analogy with semiconductor statistics. in water and development of statistics of liquid electrolytes by analogy with semiconductor statistics.

**Key words:** Water surface charge, charge carrier semiconductor.

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**Проникновение зарядов через поверхность воды**

Общая цель исследований данной работы состоит в экспериментальном обнаружении внутренних электрических свойств, присущих (электрическим) носителям в воде, и изучении развития статистики жидких электролитов по аналогии со статистикой полупроводника.

**Ключевые слова:** вода, поверхность, заряд, носитель заряда, полупроводник.

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**Зарядтардың судың беті арқылы енуі**

Бұл зерттеулердің жалпы мақсаты, жалпы мәселесі судағы тән (электрлік) тасымалдаушыларды және сұйық электролиттердің аналогия бойынша жартылай өткізгіштің статистикасымен тәжірибелік анықтау болып табылатын ішкі электрлік қасиеттерді тәжірибе жүзінде анықтау болып табылады.

**Түйін сөздер:** су, бет, заряд, заряд тасымалдаушы, жартылайөткізгіш.

The general goal of this project is experimental investigation of the properties of intrinsic (electric) The general problem of this project is experimental investigation of the properties of intrinsic (electric) carriers in water and development of statistics of liquid electrolytes by analogy with semiconductor statistics. in water and development of statistics of liquid electrolytes by analogy with semiconductor statistics. The most apparent argument in favor of such development is the absence of the concept of intrinsic electrolyte and, specifically, an agreed definition of «doped electrolyte» properties (by analogy with intrinsic semiconductivity in crystalline media [1]) in modern thermodynamics of electrolyte (see [2,3]) which is important for development of the whole statistics of weakly charged liquid. The proposed set of problems with the general title «Screening properties of pure water» specifies the concept of intrinsic electrolyte by the example of water and provides a practical opportunity to understand its typical features. Such media exhibit a spontaneous probability of nucleation of proton-hydroxyl pairs initiated by the presence of an external field. This property whichis not found in thermodynamics of electrolyte (implying the known Oswald law [2, 3]) is «identity card» of vacuum states: spontaneous nucleation of electron- positron pairs in electromagnetic vacuum [4]; occurrence of «electron-hole» pairs in vacuum of solid [4] or liquid pure solvents; pair excitations in lattice vacuum of ion (molecular) crystals [5]. Some of the observed effects of proton-hydroxyl instability of pure water in external field is discussed and checked both theoretically and experimentally within the framework of the Project.

Experimental studies of penetration of positive charges through a nitrogen-gas/water interface

have been carried out. The measurements were performed on a cylinder capacitor consisting of a 20 mm deep metal cup 50 mm in diameter and an upper metal plate 15 mm in diameter, Fig.1. The water was poured to the rim of the cup. The spacing between the water surface and the upper electrode was 1 mm. The capacitor was placed into a glove box with a nitrogen atmosphere. Positive dc voltage was applied to the metal cup and the incoming charge on the upper electrode was measured by means of an electrometer. Under the action of electric field the positive charges rose to the liquid surface and the negative ones descended into the lower electrode. Charged liquid surface can lose stability at a charge concentration under the surface above a critical value. At voltages above U = 900V surface water discharge is observed: at the instant of breakdown a $10^{-10}$ coulomb charge Q arrives onto the upper plate, Fig.2. The discharge process reoccurs with a period depending on applied voltage U. The observed periodic surface charge-discharge cycles point to time reproducibility of carriers in the liquid volume.

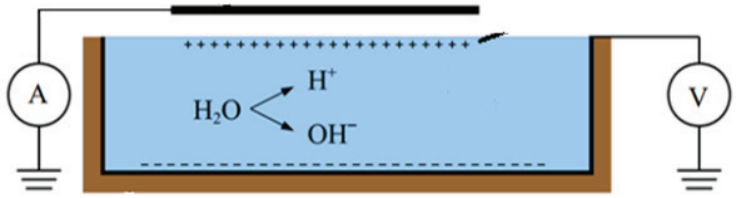


**Figure 1** – V– voltage source, A– electrometer

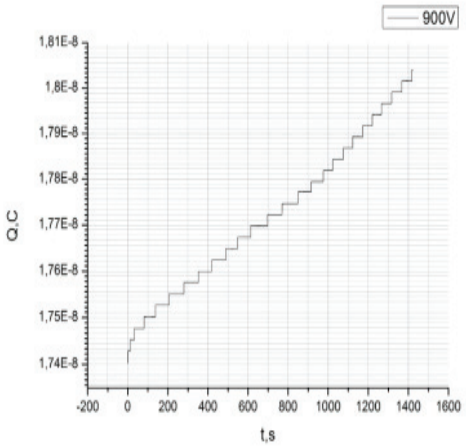


**Figure 2**

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