Formation of hydrogen miniatoms in the medium of free electrons – the key to the mechanism of low-energy nuclear reactions

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Computer modeling by molecular dynamics methods previously showed that the electrons of the outer shells of metals have a shielding effect on deuterons and significantly accelerate nuclear fusion reactions [1-6]. We have modeled the behavior of hydrogen atoms in the flow of free electrons in metals. The trajectories of the particles were calculated by numerically solving a system of differential equations of mechanics. Relativistic equations were used, and the interaction of particles was considered Coulomb without taking into account magnetic effects. About 10^4 stories were modeled, each of them containing up to 100 collisions of free electrons with a hydrogen atom. The total number of simulated atoms that experienced collisions was ~ 10^6 [7]. Dynamic modeling revealed the formation of neutral particles consisting of protons (deuterons) with an electron rotating around them in nonstationary, close to elliptical orbits with an apogee to a distance of less than 10^{-11} cm and to a perigee of ~ 10^{-12} cm [7]. These particles, which are continuously changing in size and shape, are up to 3 to 4 orders of magnitude smaller than ordinary hydrogen atoms, but 1-2 orders of magnitude larger than neutrons. Such nonstationary hydrogen miniatoms can exist for a short time (on ours estimate, up to ~ 10^{-12} sec.) in the environment of free electrons of metals, easily move in them and, like neutrons, approach the nuclei of isotopes of hydrogen or other elements at a distance at which nuclear fusion reactions or transmutation of elements are possible due to the tunnel effect. Taking into account the formation of such hydrogen miniatoms the previously calculated rate of low - energy nuclear reactions in metals [1 - 6] increases more than by 5-6 orders of magnitude, that is, to values corresponding to experimental data. Formation of hydrogen miniatoms in the medium of free electrons is of primary importance in the mechanism of low-energy nuclear reactions.

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