Excess Energy and Nuclear Products

Possible Phenomenologycal Model of Initiation of Nuclear Reactions in Solid

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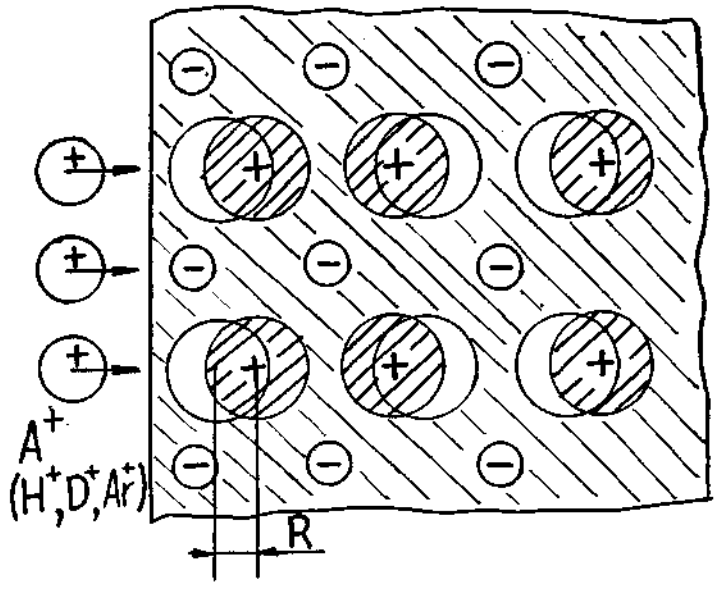
On the basis of experimental results possible model of processes of transformation of energy of a flux low energy ions in a solid is considered, which includes: generation optical pole phonons with energy 1-500 eV, in a solid at the expense of components of nuclear deceleration of a ions flux, multicascade unharmonic processes of the third and fourth orders (merge two and three phonons in one with a increase of frequency) and formation of populated level of nucleuses with effective phonon in temperature up to a few tens and hundreds keV (a phonon laser of P. Hagelstein), Interaction populated of phonon levels with electrons and generation of fast electron beams (electronic laser) is discussed. Opportunity of realization between nucleuses with such phonons by excitation of nuclear reactions of a following type is considered: $A + B = C^* + D^*$ These reactions can be resonant (long-haul acting) under a following condition: the difference between energy of reaction by received new nucleuses C^* and D^* and energy of excited nuclear levels C^* and D^* is size small (up to a few tens keV).

It is possible to mark two types of nuclear reactions: 1- with formation radioactive nuclides, which are observed practically for any working gases including Ar and cathode samples from the majority of metals with intensity 10^{-2}-10^{-3} s^{-1} , 2- reactions proceeding for some metals with H_2 and with D_2 by intensity 10^{-11}-10^{-12} s^{-1} and forming stable nuclides with excess heat without decelerated γ- radiation.
The removal of energy from the excited levels C^* and D^* can be to realization by the way electron - multiphonons of interaction (inradiative transitions in a solid), when the energy is transmitted to a plenty of thermal phonons of a crystal lattice.



Fif.1. Generation of optical pole phonons.

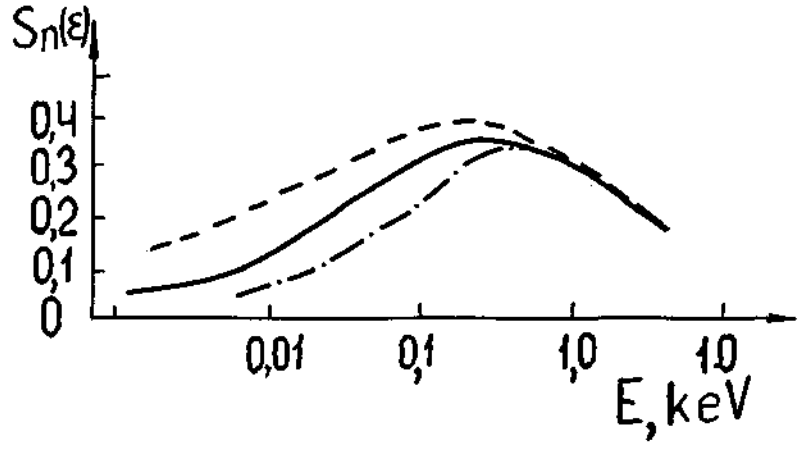


Fig.2. Efficiency of nuclear deceleration of a ions flux.

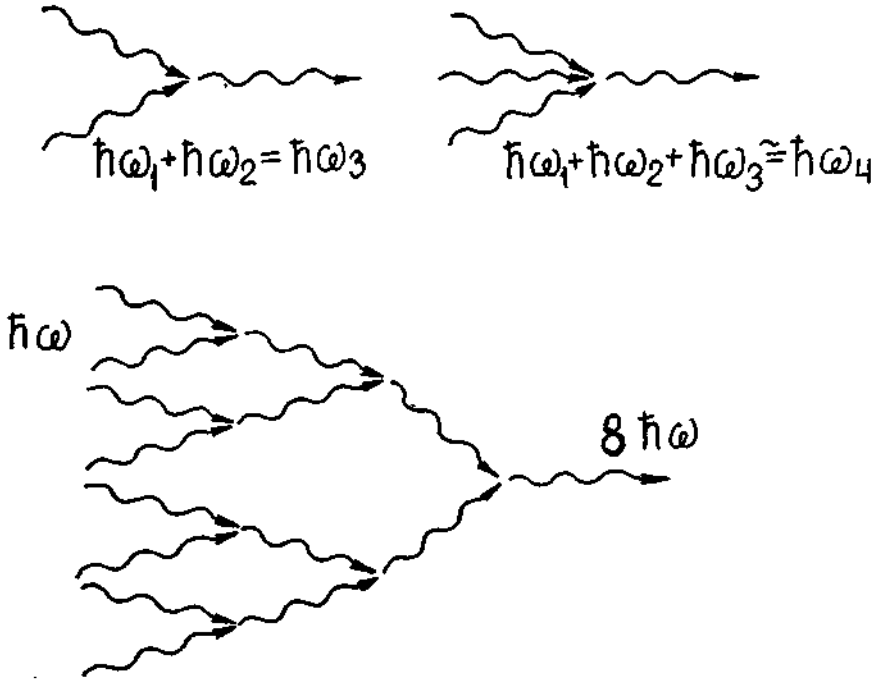
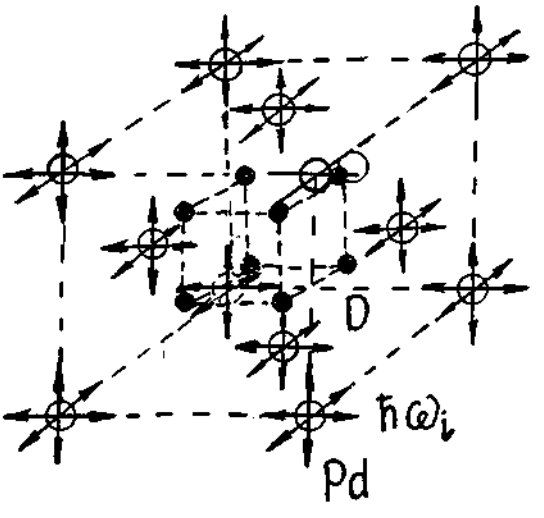


Fig.3. Multicascade unharmonic processes.



Fif.4. Formation of populated levels of nucleuses,
T(crystal lattice) = 20-300°C, T(optical phonons) = 10-1000 keV.

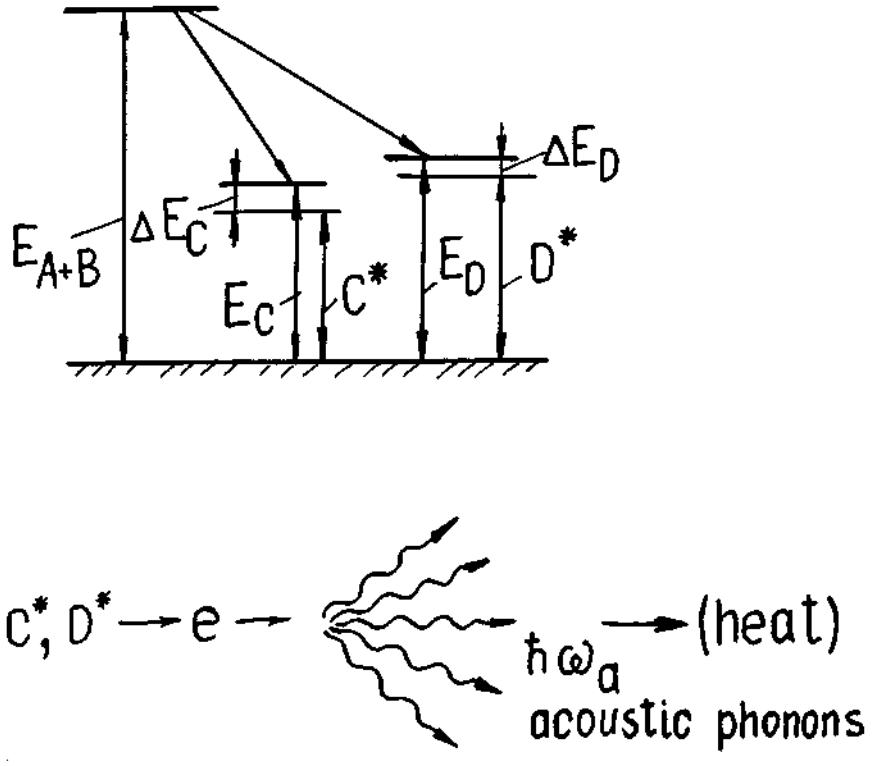


Fig.5. Schematic diagram of resonant (long-haul acting) nuclear reactions.