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THEORETICAL MODEL OF THE PROBABILITY OF FUSION BETWEEN DEUTERONS WITHIN DEFORMED CRYSTALLINE LATTICES WITH MICROCRACKS AT ROOM TEMPERATURE

NUCLEAR REACTIONS
IN SOLIDS

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It is demonstrated that the deformation of the crystalline lattice at room temperature can influence the process of fusion of the deuterons introduced into the lattice by deuterium loading. In fact, calculating the probability of deuteron-plasmon fusion within a microcrack, showed, together with the enhancement of the tunneling effect, an increase of at least one to three orders of magnitude compared to the probability of fusion on the surface of the lattice. These phenomena open the way to the theoretical hypothesis that a kind of chain reaction, catalyzed by the microcracks produced in the structure as a result of deuterium loading, can favor the process.

the thermodynamic conditions or to other factors, can increase the rate of fusion. As a result of the numerical calculation performed for different metals, varying the temperature, the total energy, and the concentration of impurities, it was possible to conclude that the probability of fusion was in effect substantially enhanced by increasing these parameters.

In this paper, we wish to confirm the hypothesis regarding microcracks by means of quantitative theoretical estimates of the coefficient of structural deformation of the perturbed² crystalline lattice independent of time, obtained for different temperatures from 100 to 300 K. In particular, we calculated the probability of fusion within a microcrack, comparing it with that calculated on the surface, to evidence a possible enhancing effect. We also wish to observe, theoretically, any influence on the phenomenon produced by variations in temperature, which