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Search for Multibody Nuclear Reactions in Metal Deuteride Induced with Ion Beam and Electrolysis Methods

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Abstract:

We report here the experimental results suggesting the occurrence of multibody nuclear reactions in metal deuterides under ion-beam irradiation and electrolysis. A meaningful increase of helium-4 was observed during electrolysis with the Pd-D₂O system, while neutron emission was not observed. The D+D+D fusion, $3D \rightarrow t + {}^3\text{He} + 9.5 \text{ MeV}$, has been observed repeatedly in deuteron-beam irradiation experiments with a TiD_x target. On the other hand, in proton-beam experiments with TiD_x, H+D+D-fusion: $H+D+D \rightarrow p + {}^4\text{He} + 23.8 \text{ MeV}$ was observed. Considering this result, it seems that the 3D reaction occurred between two deuterons trapped closely in TiD_x and an incident particle of deuteron. The multibody nuclear reaction model can interpret both the results obtained in electrolysis and ion-beam experiments. It is considered that the lattice dynamics of metal deuteride is of key importance for inducing short-transient and closely packed d-d pairs and, thus, such fusions.

Keywords:

multibody nuclear reactions, electrolysis, helium-4, deuteron beam, proton beam, lattice dynamics

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