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Full atomic theory of cold fusion

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Abstract. A primary theory for the cold fusion mechanism is proposed early in 1989 by us based on atomic, molecular, nuclear and crystal physics. According to this theory, the cold fusion of deuterons may be raised in crystal with produce of excess heat and fusion products ^{4}He. After this theory, the remarkable effects of excess heat and fusion products ^{4}He were observed during the electrolysis of heavy water with Pd or Ti electrodes in our experimental researches. These results indicate that the prediction in our theory is valid. In order to get more clear understanding for the cold fusion, further theoretical and experimental studies had been carried out extensively by us in the past twenty years. Through a deep analysis, we find that the cold fusion is arised from the interaction of two adjacent full atoms (contain nucleus and valence electrons) of heavy hydrogen in the interstitial position of crystal. This full atomic theory will be discussed in detail in this paper. According to this theory, we find out that ^{3}He may be made from the cold fusion of heavy hydrogen and hydrogen atoms.

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1 Introduction

Two decades ago, Fleischmann and Pons [1] reported excess heat generation during electrolysis of D_2O on Pd electrodes. In particular, they reported that during electrolysis, the excess heat is generated in the amounts that could not be accounted for by any known physical or chemical process. Hence, it must be of a nuclear origin. In the months and years that followed, the tritium and helium production were discovered in Pd/D electrode [2–5]. The nuclear production would be formed from the nuclear fusion of D in the Pd crystal. This nuclear fusion is raised in the crystal at ordinary temperature and is called cold fusion. This is a very important result. But to search out the cold fusion mechanism is a more important basic research work.

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A primary theory for the cold fusion mechanism is proposed early in 1989 by us based on atomic, molecular, nuclear and crystal physics [2]. We think that when a deuterium atom is absorbed by a palladium crystal and penetrate into the interstitial position, its electronic cloud sphere will be expanded into a large one due to the attraction of the surrounding six palladium atomic cores, as show in Fig.1. Therefore the binding energy between the deuteron and its valence electron is greatly decreased and the deuteron is highly mobile in the large cloud sphere. The repulsive force between two neighboring deuterons immersed in the electronic cloud is greatly decreased due to the screen effect. Therefore the close collision between the deuterons and nuclear fusion will be raised easily and do not need very high temperature. The fusion products are ^{4}He and its fusion energy is used to rise the temperature of the crystal and give out excess heat. After this theory, the remarkable effects of excess heat and fusion products ^{4}He were observed during the electrolysis of heavy water with Pd or Ti electrodes in our experimental researchers [2]. These results indicate that the prediction in our theory is valid. We know, however, that there are many scientists still can not understood clearly for the cold fusion mechanism. In order to get more clear understanding for the cold fusion, the further theoretical and experimental research has been studied repeatedly by us in the past twenty years. Through a deep analysis, we find that the cold fusion is raised from the interaction of two adjacent full atoms (contain nucleus and valence electrons) of heavy hydrogen in the interstitial position of the crystal. We shall proceed now to discuss this full atomic theory in detail in the following paragraphs.

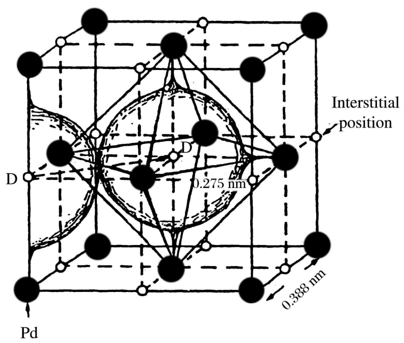

Figure 1: Sketch of the state of two adjacent deuterium atoms in palladium crystal

2 Full atomic state of the interstitial atom in crystal

For simplicity, we can see from Fig. 1 that the state form of the interstitial atom is a sphere with radius 0.137 nm as shown in Fig. 2 [3]. Its valence electronic cloud is distributed entirely in the inner side of the sphere and its deuteron is highly mobile in the sphere. This state denotes a full atom enclosed in a sphere with radius 0.137 nm. The quantity of