## Excess Energy and Nuclear Products

# The Relationship of Crystal Structure Transition of Ti-Cathode and "Excess Heat" on Cold Fusion

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Abstract

This paper presents an experiment result of crystal structure transition of Ti-cathode due to "excess heat" of cold fusion. It has been found that the crystal structure of Ti-cathode is changed from hexagonal to face-centered cube structure after cold fusion with "excess heat". On the contrary, there will be no observable change for that without "excess heat".

Key Word: Deuterium, Titanium, Structure of Lattice.

1. The x-ray analysis of Ti-Cathode before electrolysis experiment.

Before the electrolysis, the surface of Ti-rod was analyzed by x-ray, which showed that it was indeed oxidized into $TiO_2$ (Fig. 1) identified by x-ray spectral lines: (1) 0.3201nm, (2) 0.2500nm, (3) 0.2305nm, (4) 0.2203nm, (5) 0.2200nm, (6) 0.1695nm in good agreement with the standard x-ray spectral lines of $TiO_2$: (1) 0.324nm, (2) 0.249nm, (3) 0.229nm, (4)

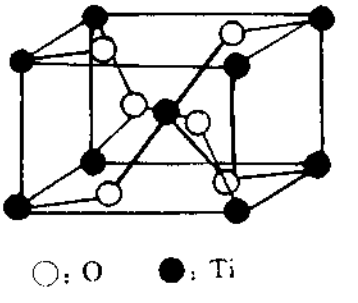


Fig. 1 The Crystal structure of $TiO_2$

0. 219nm, (5)0. 206nm, (6)0. 169nm. (Fig. 2). It was also examined by x-ray analysis that the inner part of Ti-rod is α-Ti(Fig. 3)identified by x-ray spectral lines: (1) 2. 563nm, (2) 2. 343nm, (3) 2. 240nm, (4) 1. 726nm comparable with the standard lines: (1) 0. 2558nm, (2) 0. 2341nm, (3) 2. 244nm, (4)1. 729nm of hexagonal α-Ti. (Fig. 4)

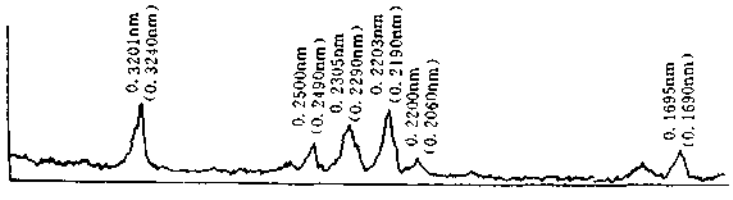


Fig. 2 The x-ray spectral lines of the surface of Ti-rod

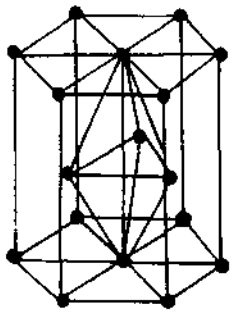

Fig. 3 The hexagonal crystal structure of α-Ti

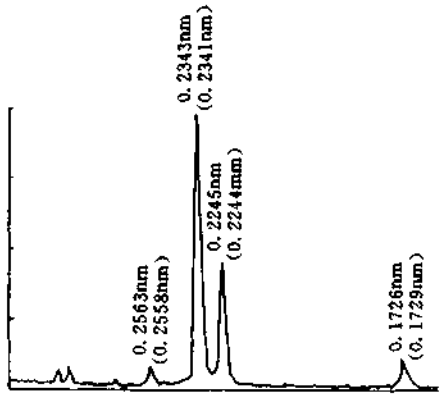


Fig. 4 The x-ray spectral lines of the inner part of Ti-rod

2. The crystal structure analysis of Ti-Cathode without "excess heat" during the electrolysis experiment.

The electrolytic solution was prepared to be a mixture of low purity $D_2O$ and $H_2O$, therefore, it was not observed the "excess heat" after more than 20 days of electrolysis experiment. The Ti-rod we used was pretreated, so the x-ray analysis showed that the Ti-rod is α-Ti, and it was no change after

Standard spectral lines of Ti-$H_2$ are: (1) 0.25nm, (2) 0.221nm, (3) 0.156nm, (4)0.133nm, (5)0.121nm, (6)0.110nm, (7)0.101nm.

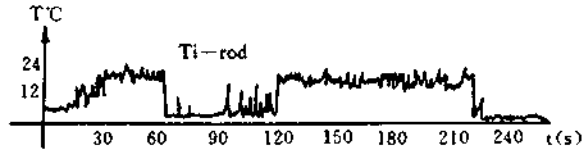


Fig. 7 The highest Temperature ascent of Ti-cathode on cold fusion


Fig. 8 The x-ray spectral lines of Ti-cathode before electrolysis

The spectral lines of Ti-fod after"excess heat" are: (1)0.2533nm, (2) 0.2119nm, (3)0.1535nm, (4)0.1323, (5)0.1261nm, (6)0.1101nm, (7) 0.1008nm. (Fig. 9)

These 7 spectral lines correspond to the standard ones. We could say that the surface of Ti-cathode had been cahanged into Ti-$D_2$ structure. (Fig. 10)

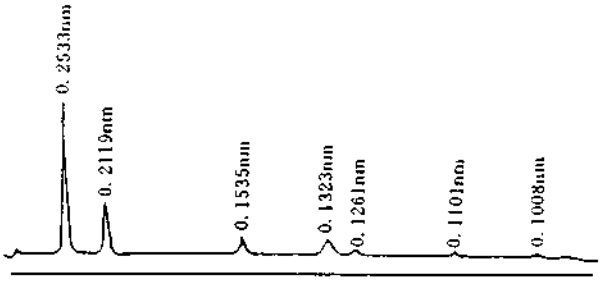


Fig. 9 The x-ray spectral lines of Ti-rod after electrolysis

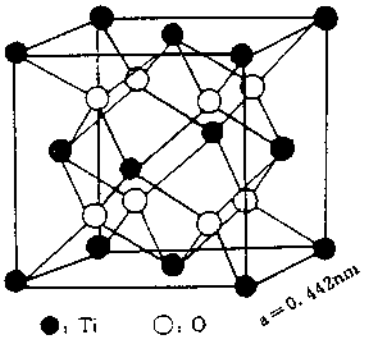


Fig. 10 The crystal stractrue of Ti-$D_2$

4. Conclusion

From the experiment, we could come to the conclusion that Ti-cathode absorbs D and then changes its crystal structure from hexagonal to the face-centered cube of $TiD_2$ owing to the electrolysis in $D_2O$. Because of these, the probability of collision will increase, which leads to nuclear fusion accompanied with remarkable "excess heat" effect.

References

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