ABOUT PRODUCTS OF NUCLEUS REACTIONS DURING DIFFUSION OF DEUTERIUM THROUGH PALLADIUM MEMBRANE.

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The present manuscript deals with experimental testing (examination) of the earlier proposed mechanism of low energy nucleus reaction (LENR) [1,2] in a metallic matrix.

The experimental device comprises a metallic chamber with a system for heating. A cylinder with a fixed membrane is installed inside this heating system. For processing a required structure the membrane has been subjected to thermo-mechanical treatment.

The manuscript considers the results of measurement of helium (IV) and tritium concentration as well as metallographic studies of a membrane surface.

1. Afonichev D.D. Mechanism of cold fusion via tritium channel, Int. J. Hydrogen Energy, 2006, V. 31,No 4, pp. 551-553.
2. Afonichev D.D. Resonance transfer of neutron from deuteron – mechanism of low energy nucleus reactions in metals, Proceedings of ICCF13, 2007Sochi, Russia, Ed. Yu. Bazhutov, Moscow, 2008, pp. 550-553.

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Preface

- On the basis of the results of our previous experiments on deformation of deuterium saturated titanium alloy samples and saturation of titanium alloys, the mechanism of cold nuclear fusion proceeding via the tritium channel is proposed.

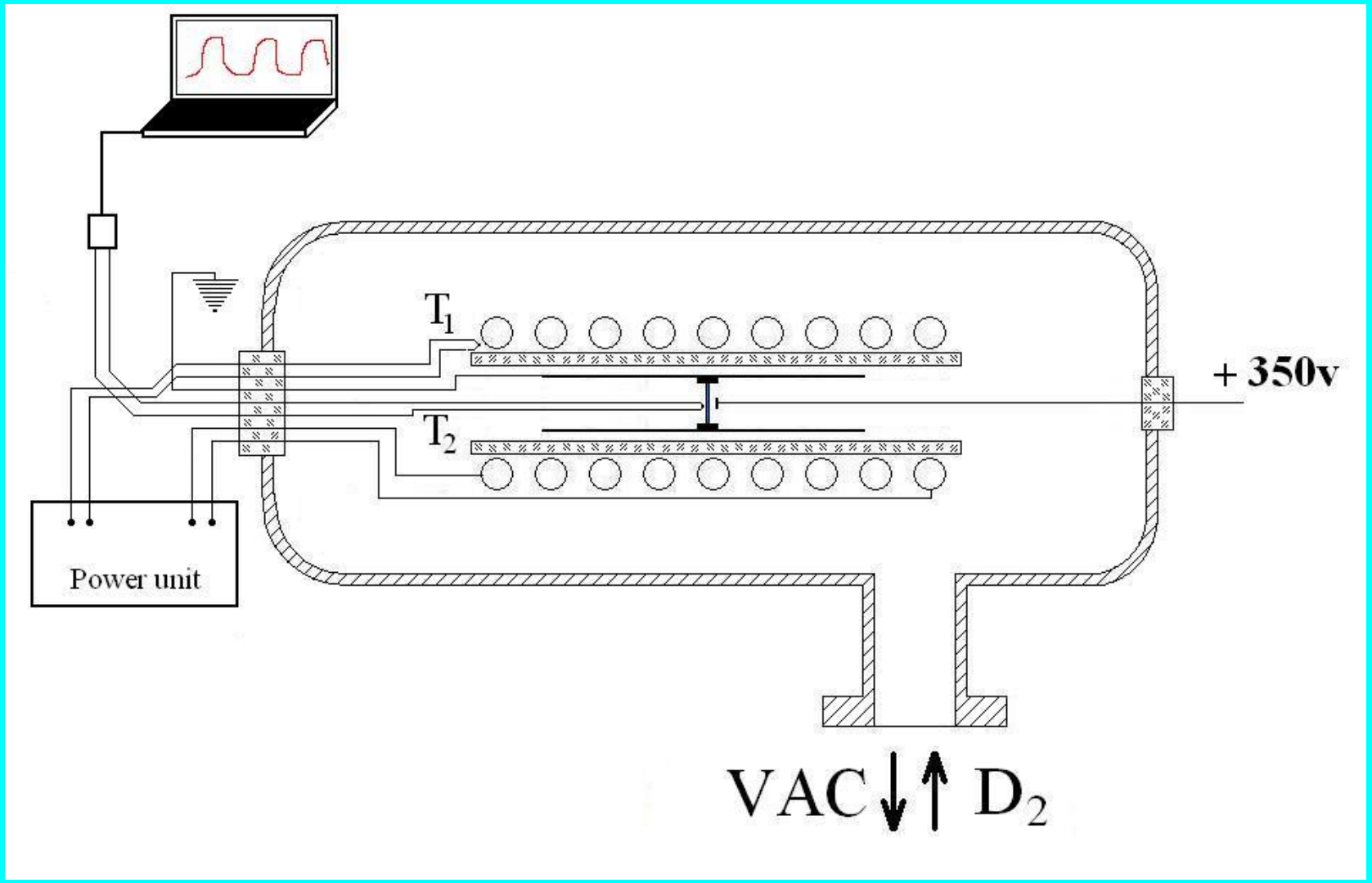
Background

- While planning our experiment we proceeded from the following :
- 1. cold nucleus fusion should be uninterrupted,
- 2. experiment should be performed at high temperature to increase a rate of deuterium diffusion in metal,
- 3. deuterium flow should be orientated in one direction.

Background

- The performance of the experiment in deuterium gas phase provides all these conditions. Since the process occurs on the metal surface the reaction displays more evidently at diffusion of deuterium through a membrane. Glow discharge on one side of the membrane creates orientated deuterium flow.

Scheme of a device



Scheme of a device

- The Pd foil with prepared structure is positioned hermetically in a tube out of stainless steel which is installed in a furnace providing heating up to T= 1000 C.
- After vacuumization the balloon was filled by deuterium P<0,07 MPa
- Discharge **I**=40 ma, U=350 v was energized.

Experiment

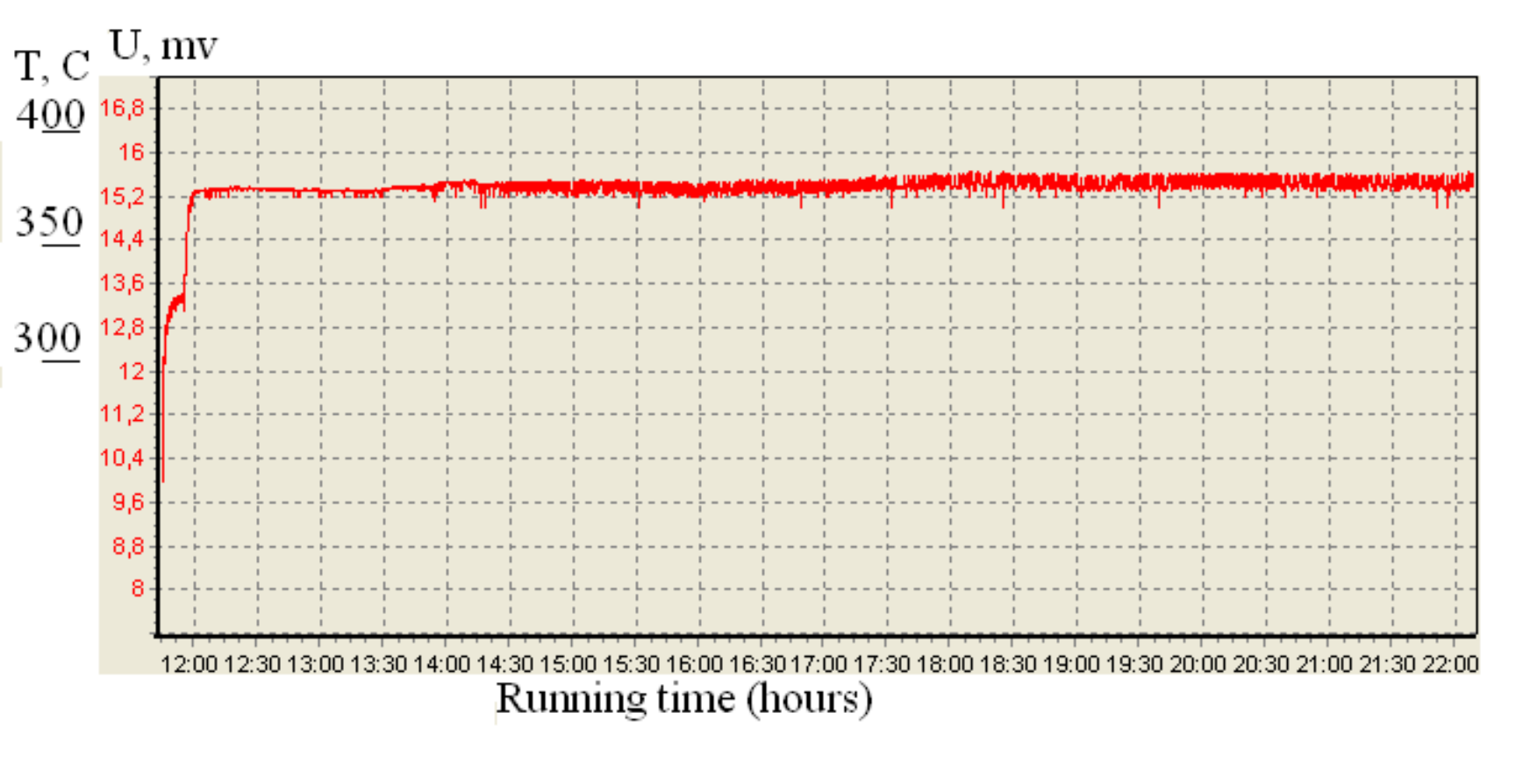


Fig. 2

- Change in temperature nearby of Pd membrane

Experiment

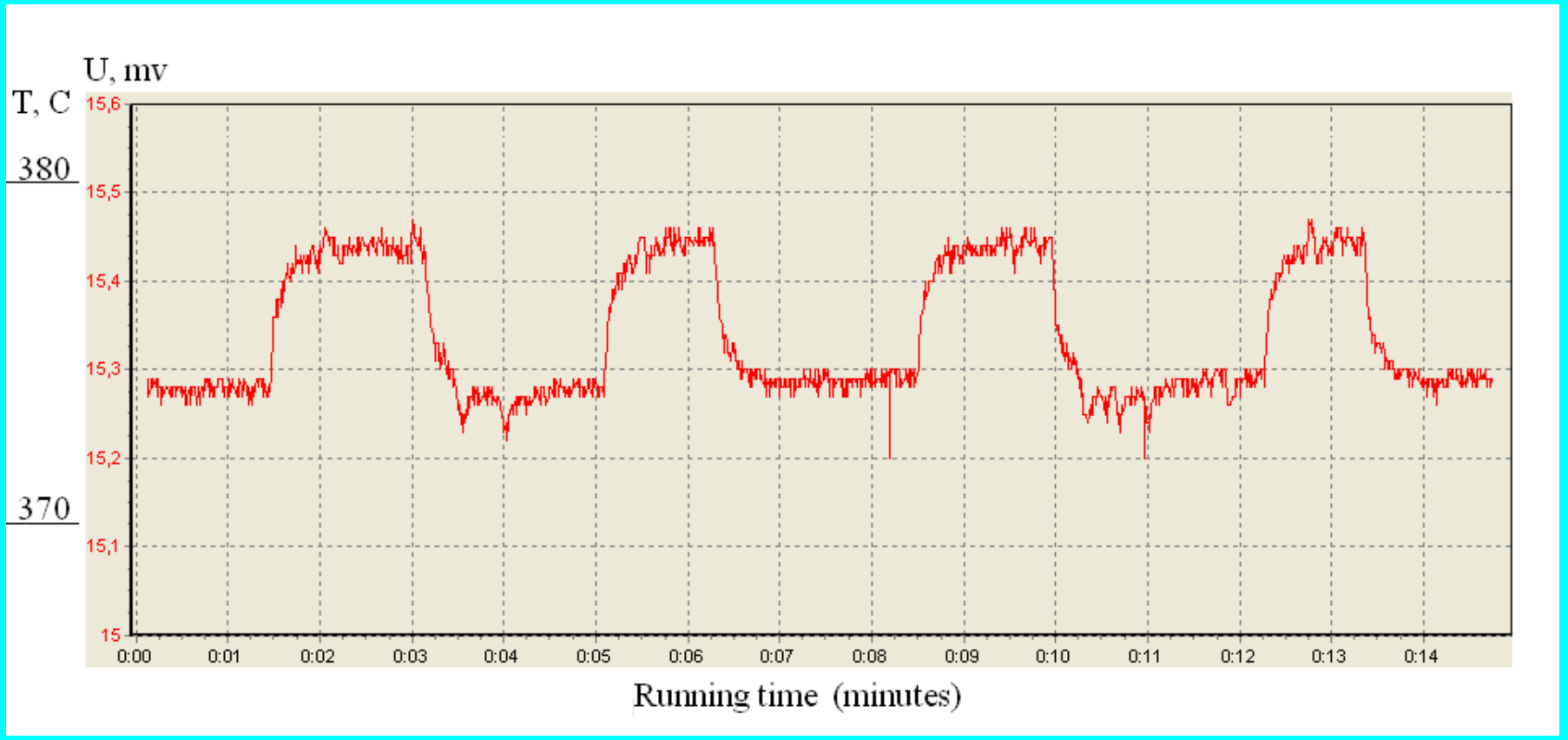


Fig. 3

- Temperature fluctuation in 36 hours after discharge on.

EXPERIMENT

- Discharge was off in 42 hours after the onset.
- Gas in a steel balloon (100 ml) was used for making a mass spectrometric analysis.
- The amount of ^4He is on the background level.
- Ti powder 3 g in weight absorbs the remaining gas to analyze tritium.
- Tritium was measured by scintillation method, the total concentration was $N>10^9$ units.
- No threshold crossing of neutron and gamma quanta has been registered during the experiment.

Experiment

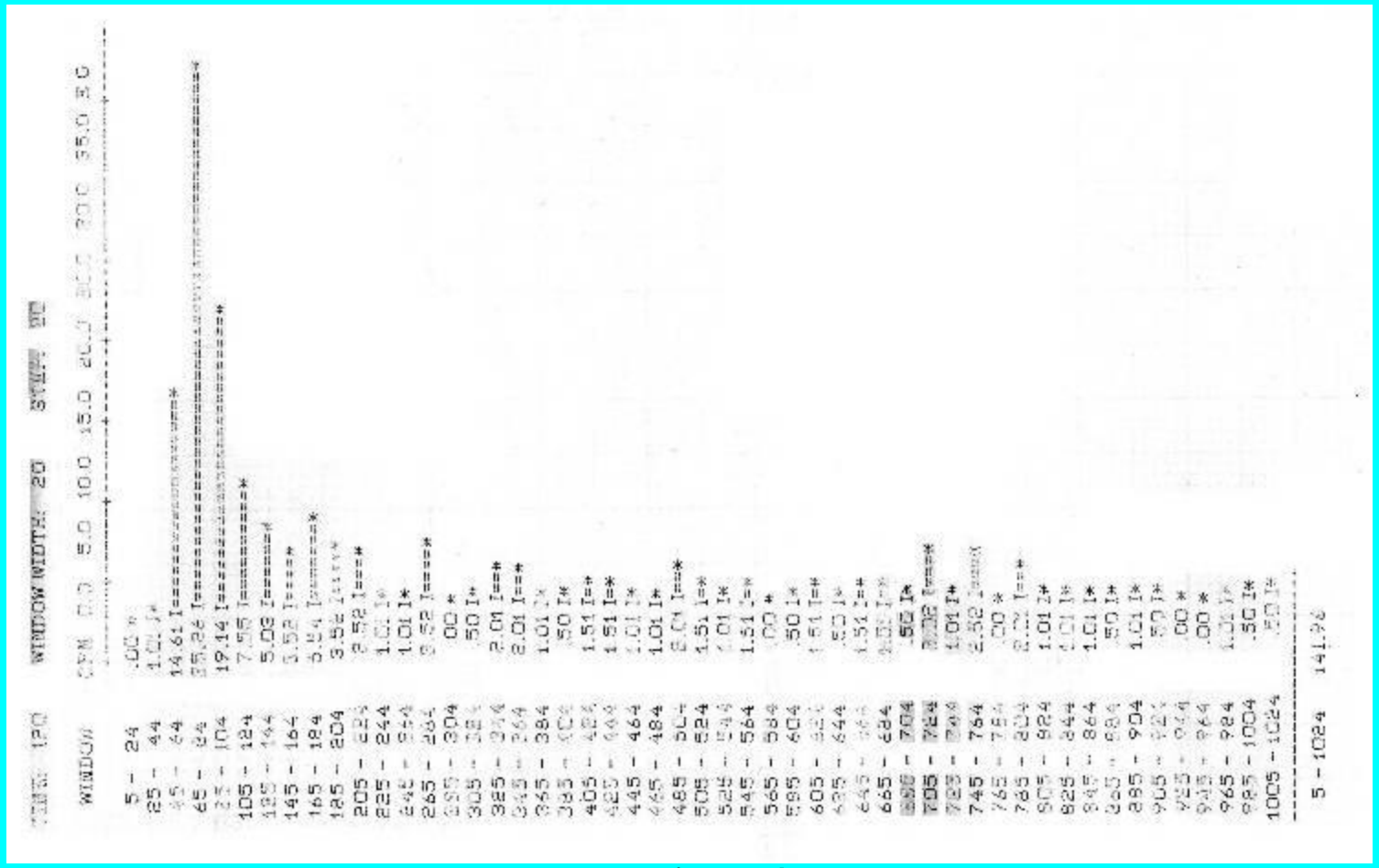


Fig. 4

- Energy distribution of tritium solution

CONCLUSION

- The device for generating heat and tritium is proposed.
- Heat fluctuation has been registered ($\Delta T=4\text{-}5^0$ C).
- The increase in tritium concentration has been registered, $N>10^9$ units .
- Low energy reaction in deuterium medium occurs via the tritium channel.