Critical analysis of the possible processes occurring in the cell Rossi.

Ph.D., winner of the USSR Council of Ministers Prize

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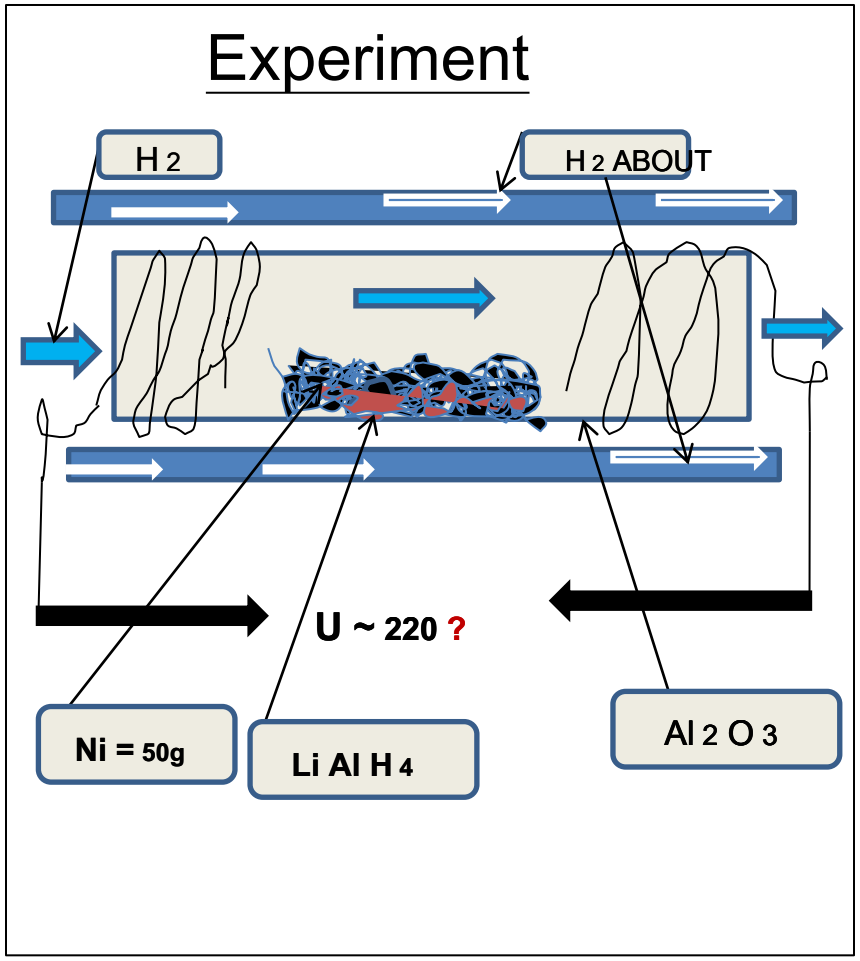
introduction

The existence of cold fusion (CNF or XT) opened a long time. See, for example, the work of AD Sakharov, YB Zeldovich years 1947-1960 (including Zel'dovich, SS Gerstein. "Nuclear reactions in cold hydrogen", UFN, 1960, Vol. 12, no. 4, pp. 581-630). This process is called muon catalysis. Practical use of CNF for energy production in the experiments of the 1950s were unprofitable as to create conditions for CNF (heavy electrons) to spend more energy than was allocated. However, naturally assume that because CNF exists, it can be implemented and less energy-intensive conditions.

In a world of widely advertised 'Generator' Rossi. However, until now the question remains whether there is actually a large release of energy in the generator, if it is implemented in the CNF? Several independent research groups have tried on fragmentary information about this "generator" to reproduce his work. The experiments did not give definite answers to these questions. Most likely, this is due to the fact that the studies were not conducted in a particularly pure chemical conditions. Presented in the report of the theoretical analysis shows that the presence of resonance phenomena may receive CNF. This is low-energy neutron flux. Based on extensive experience with highly purified substances, crystals, metals and fine chemicals, offers a fundamentally new scheme of low-cost experiments allow to study the presence or absence of the effect of energy release in the crystal-activator system: Ni + $LiAlH_4$.

Riddle CNF (LENR).

Truth or bluff of the "generator" of Russia.



HAVE

1. Container of Alundum (AL2 O3).
2. **nanopowder Ni (m = 50g) -** unclear as being obtained.
3. **The catalyst (activator) - Li Al H 4.**
4. **The flow of hydrogen H 2.**
5. **The flow of cooling - water.**
6. **The temperature of the beginning of the process - 300 ◦ FROM.**

VERDICT

1. There is a variation of the isotopic composition on Ni and Li.
2. **Provided with heat**

An efficiency of up to 11

The contradictions in the information:

1. **Prototype Rossi promised to create by 2014. Today ends in 2016 ?**

2. **For the examination of a change in the isotopic composition of the powder was transferred after 2-3 months work "generator", and the change in Li and Ni isotopes occurred more than 50%. ?**

   Although Russia claims the 30-year work of "generator". Why is there such a rapid change in the composition?

3. **Ni Cu is in transition, but no radiation. ?**

4. **Why do I need to spend a small el.moschnost (P = 300W) to the heating process, if an efficiency of 11? Stupidity or something else?**

5. ***Nanopowder, what is it? How to work with him in the hydrogen flow path, how to take it in your hands?***

Thus on the "generator" of Russia are more

questions than answers.

However, let's not give up on this and try to understand,
because The question is ENERGY
It deserves serious attention.

We assume that the "generator" operates,

and all the inconsistencies in the information on the process connected

with the closure of the work.

Nature is so diverse ...! And our science core

atom a hundred years. (the parable of the professors and students)

The question then arises: how, how to explain
what is happening in the process of "generator"
to obtain

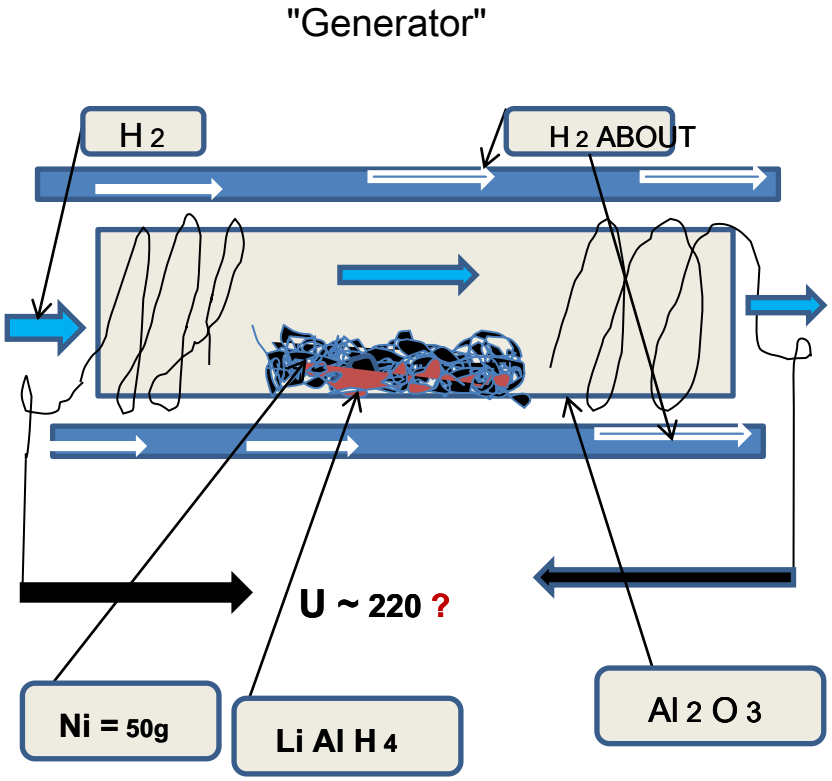
energy?

Analysis of the process.

In the present process scheme visible logic.

1. Source component - Ni - a good absorbent of hydrogen (H_2) - More than 30% by volume.
2. As aktivatra selected the most active on elhim. potential (Li) in combination hydride ($Li Al H_4$) $T_{dissociation}$ = 200-400S.
3. The atmosphere in the container (H_2).
4. Start the process of T = 300 ° C, which corresponds to T_{Thesis} catalyst - activator.
5. Absence in 2016 "generator" of the base of the sample can be linked to the lack of reproducibility.

Эксперимент



1. The temperature of the beginning of the process of T = 300 °S.

2. The supply of thermal power P = 0.3kVt.

3. Remove the power to the P = 3,3kVt.

An efficiency of up to 11

Process CNF or quasi-HT is associated with the formation of heavy electrons, can occur in strong e. fields, for example, E ~ 10^{16} V / m accelerates electrons to 5 A to MeV-energy (mc^2).

Where to get these fields and they may occur in the this process?

It is known that the penetration of substances in the crystal (diffusion) begins at sites other than the primary energy places a crystal matrix.

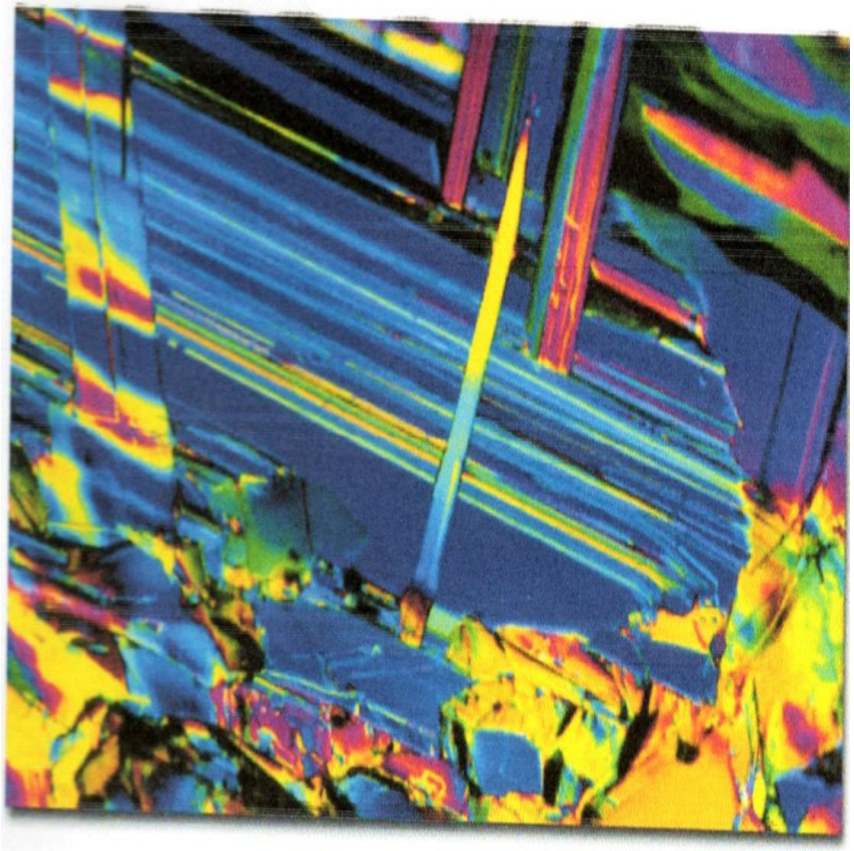
This place can be a twin boundary in the crystal or its analogue.

An attempt to explain the process with the use of models - the emergence of a strong electric field strength in the area twin boundary (DG).

Doubles or DW.

growth DG

Structural DG

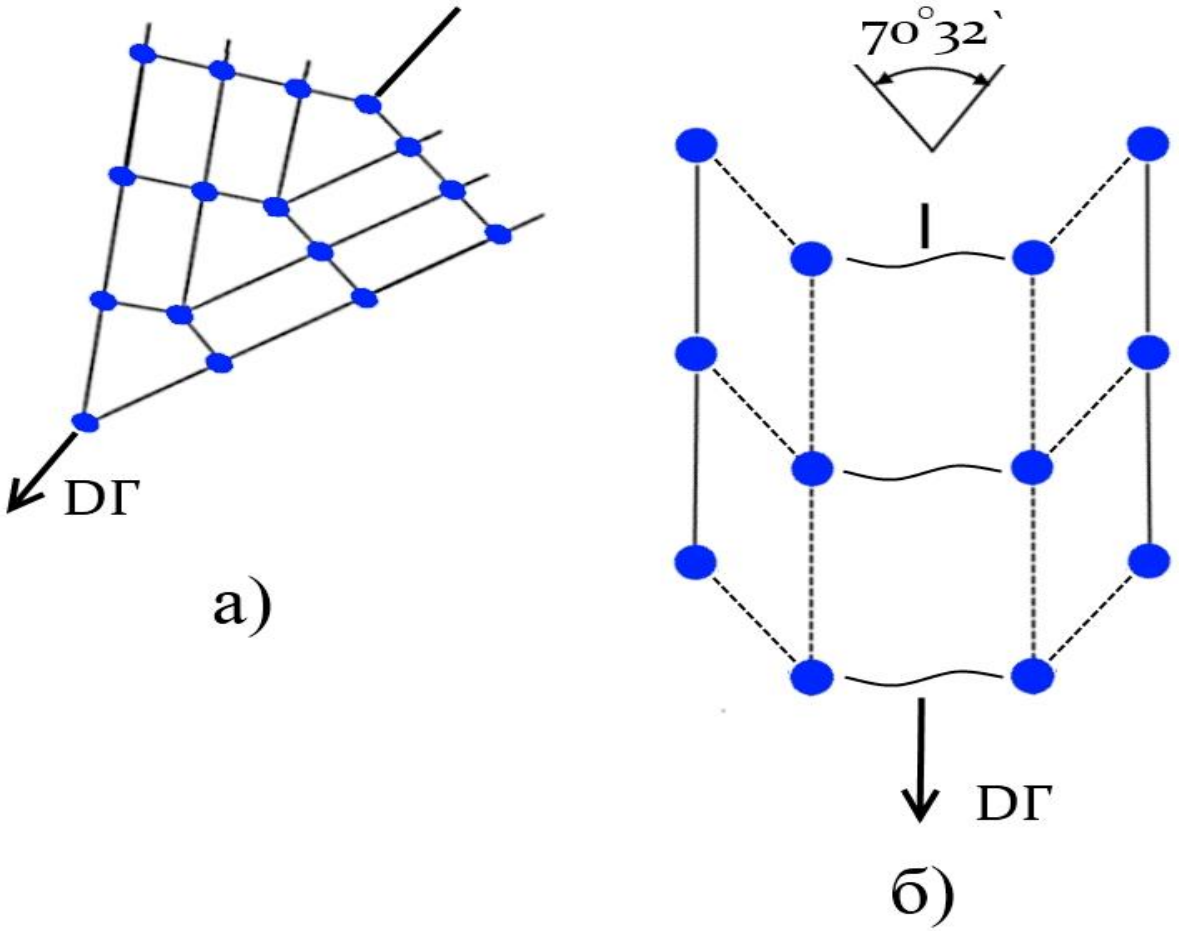


Twin boundaries (DG)

Features of DW:

1. Perfect crystallographic defect.
2. The energy of the domain wall is different from the energy of the crystal.
3. Channel DW always comes to the surface.
4. Has perfect smoothness.
5. There DW as at mechanical influence on the crystal (cold deformation) and in the fur. exposure during crystal growth.
6. The trap that holds charged particles. Free movement **e** in the DW.
7. In contrast to the point Frenkel defects and dislocations, domain walls exist up to the melting temperature.

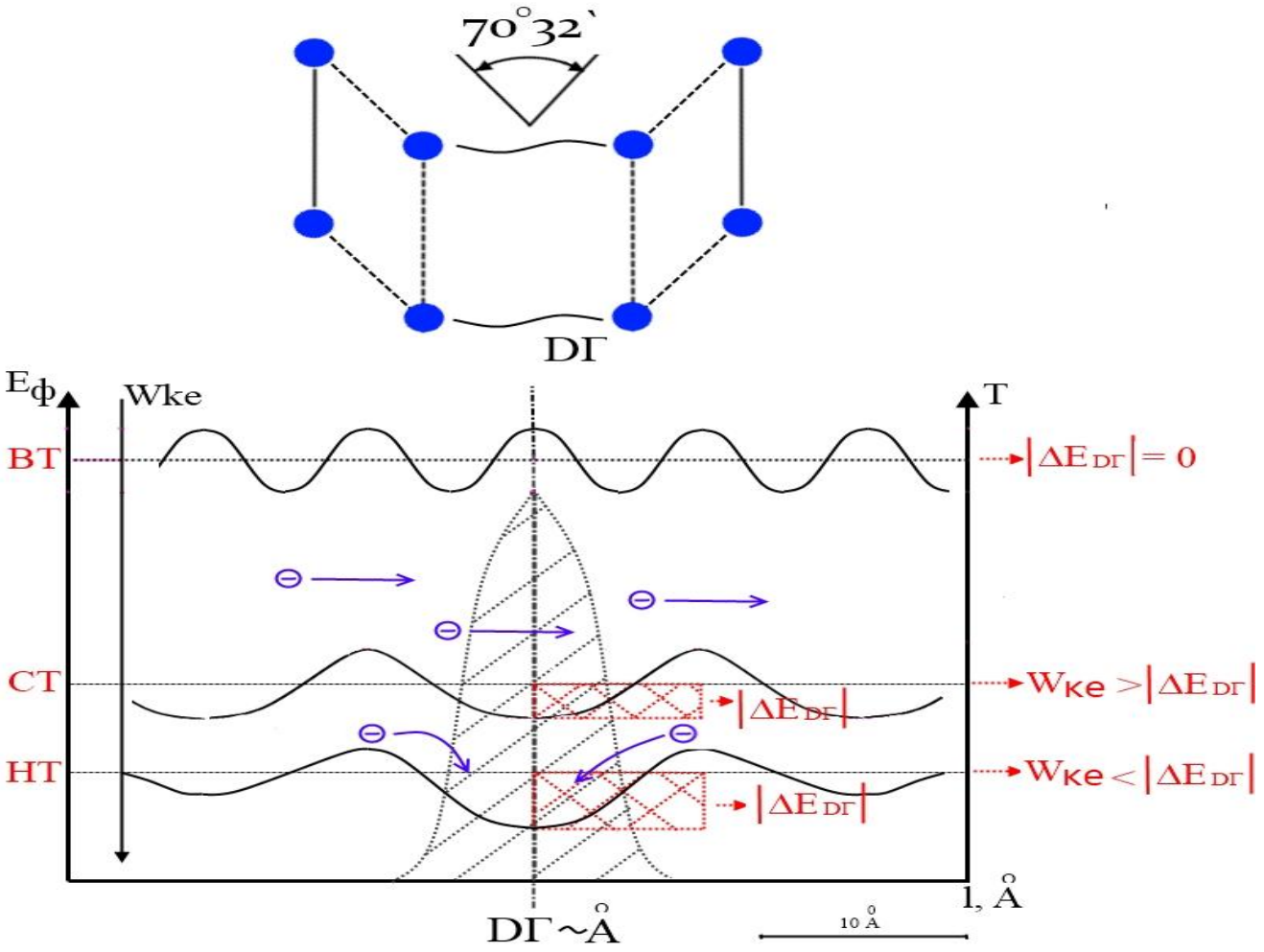
Schematic representation of the DG



ДГ - когерентная двойниковая граница
для кубических кристаллов (III), ∠ 70°32`

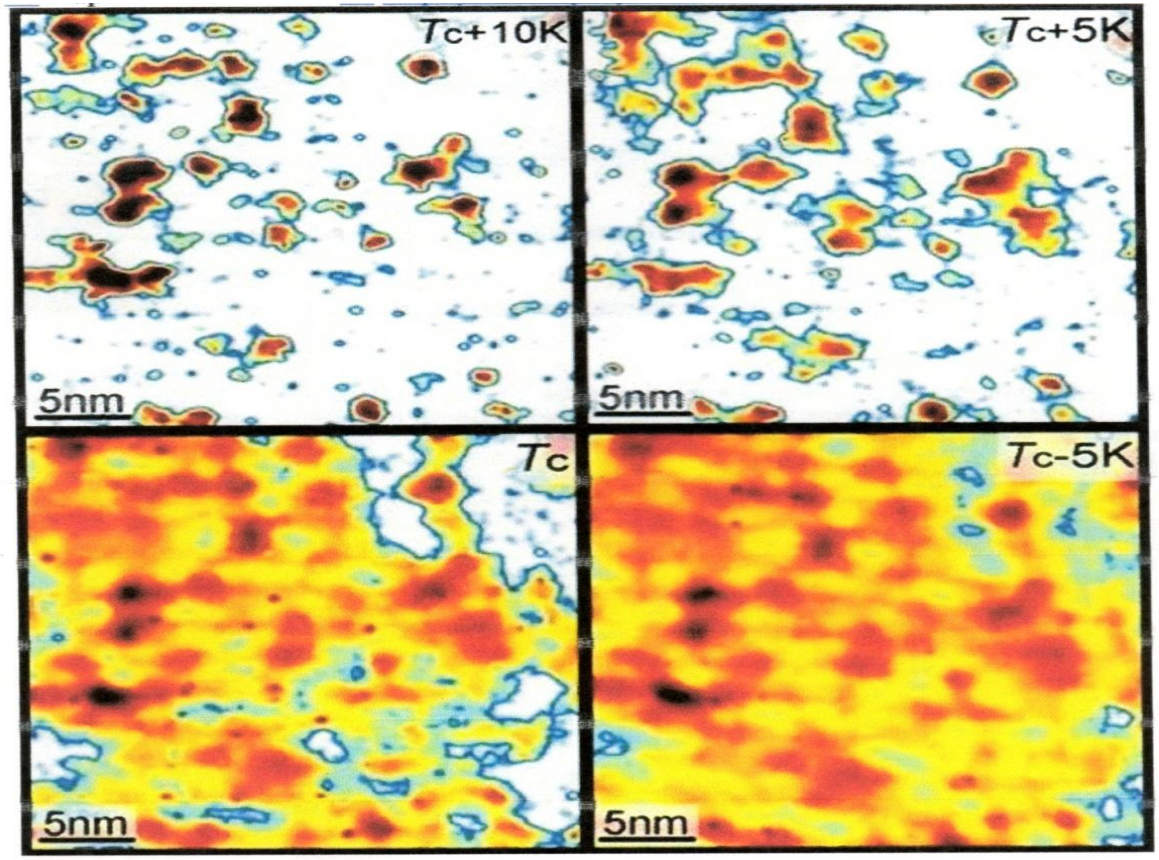
Power twin boundary

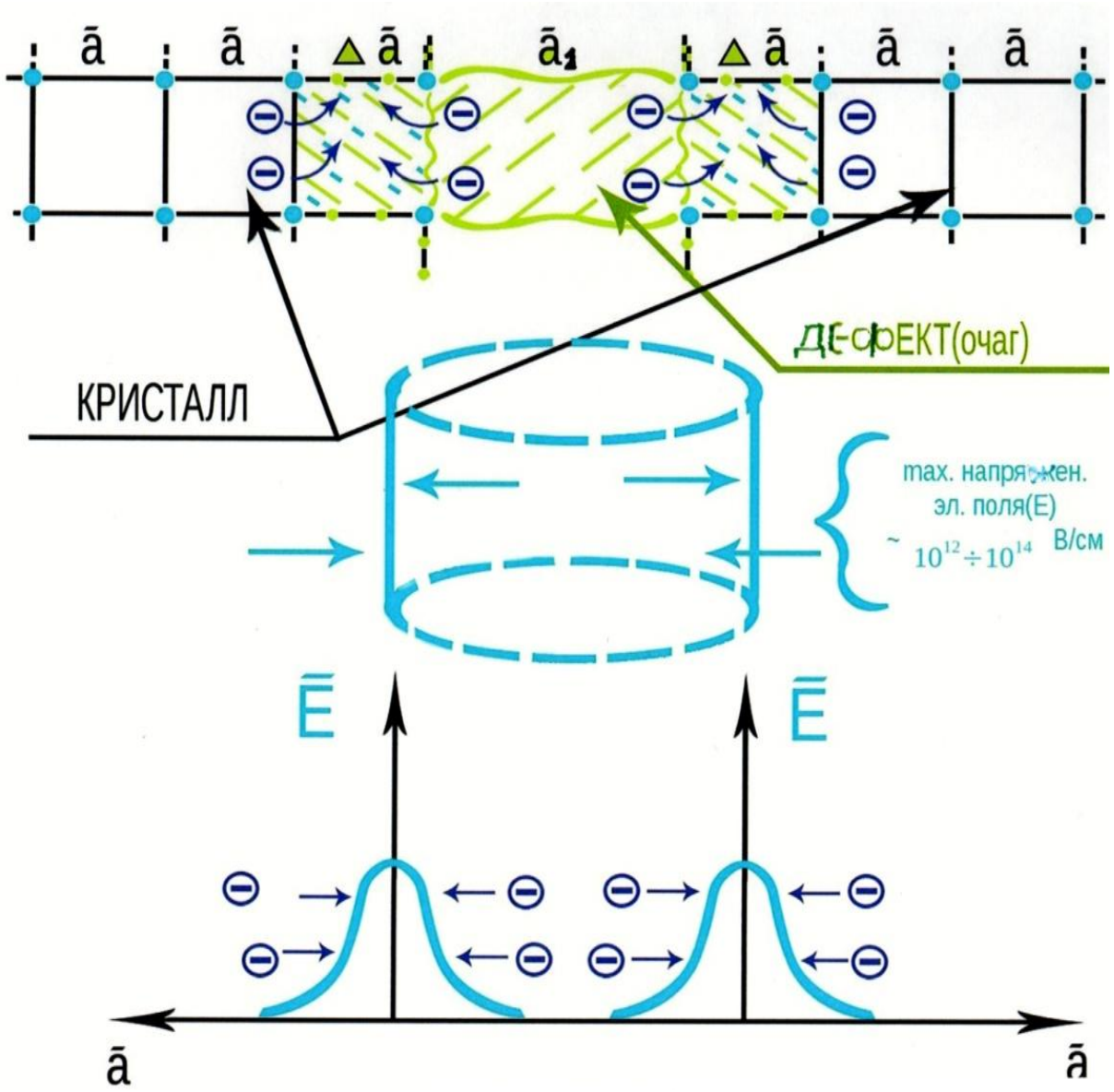
(DG)



The important role of DG in superconductivity. E lesions in HTSC ceramics.

Princeton, 2007

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ДЕФЕКТ(очаг)
КРИСТАЛЛ
max. напряжен.
эл. поля(E)
~ 10¹²÷10¹⁴ В/см
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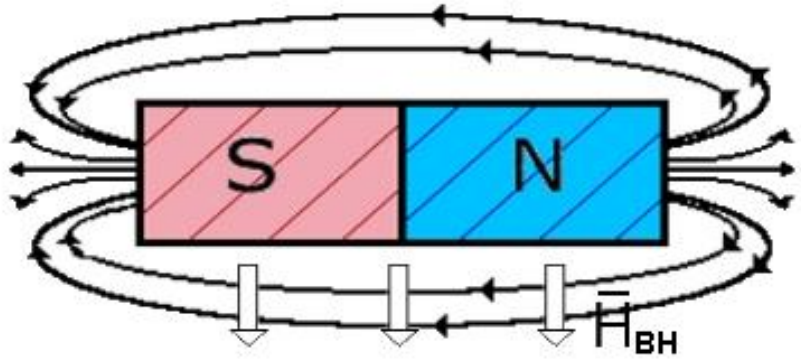
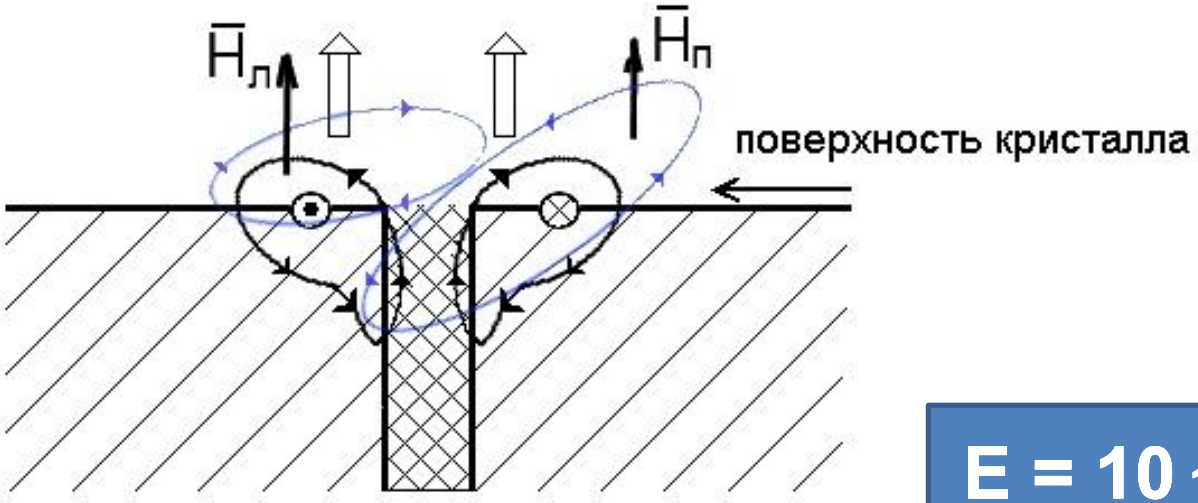
The electric field (**E)** in DG superconductor evaluated for impact

critical magnetic field (**H cr).**



$$\bar{H}_{кр} = \bar{H}_{вн} + P_{магнита}$$

(эффект Мейснера)



E = 10 12 - 10 14

/ Cm

The appearance of DW: cold deformation or work hardening.

Deformation structure.

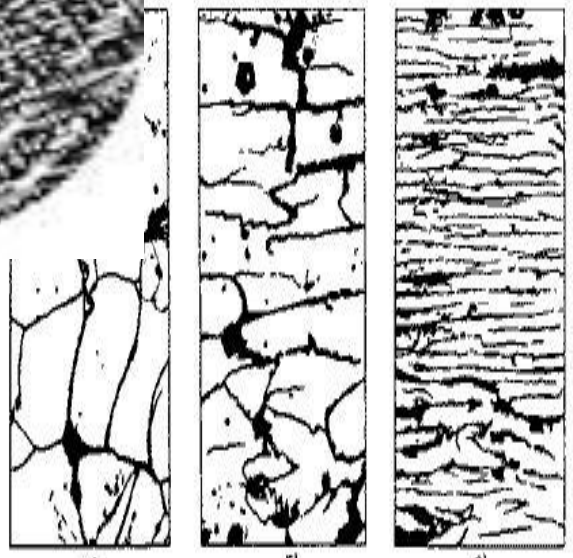


Рис.1. Изменение структуры при деформации: а) до деформации; б) после обжатия на 35%; в) после обжатия на 90%.

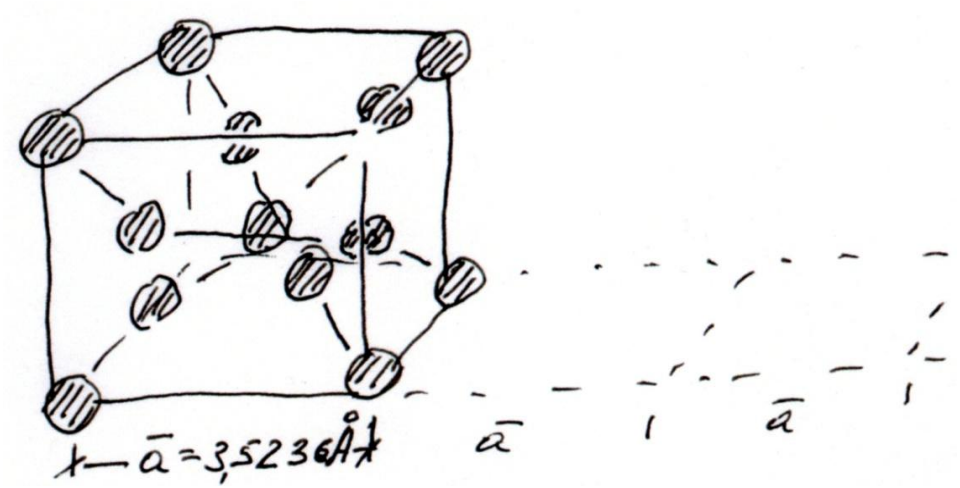
The appearance of DW: HCC -> Ni in SERS

atmosphere of hydrogen.

Types lattices Ni:

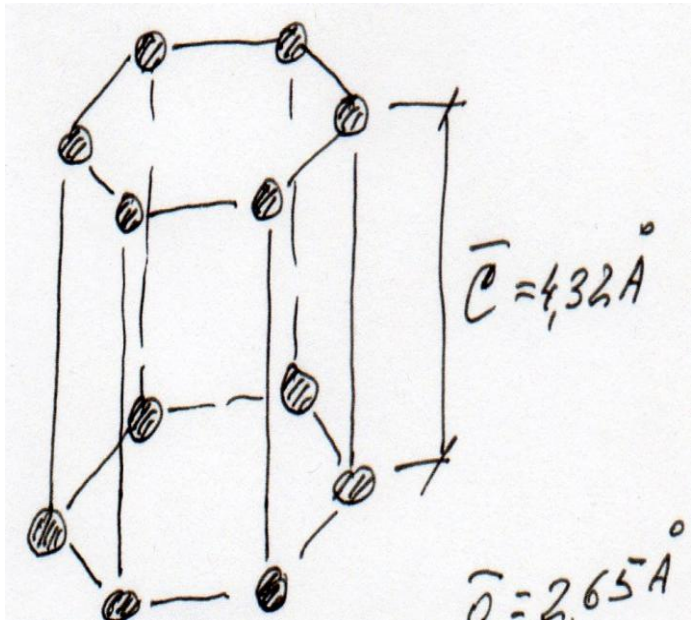
The cubic lattice

β - Modification -GTSK



The hexagonal grille

α - Modification - HRS



Transition from the cubic to hexagonal at the cathode sputtering at atm. H2

The emergence of JH sintering Ni nanoparticles.

IN Karkin, YN Gornostyrev, LE Karkin. Molecular dynamics simulations of the formation of twin boundaries during sintering of nanoparticles. // Solid State Physics, 2010, Vol 52, no. 2, c. 402-406.

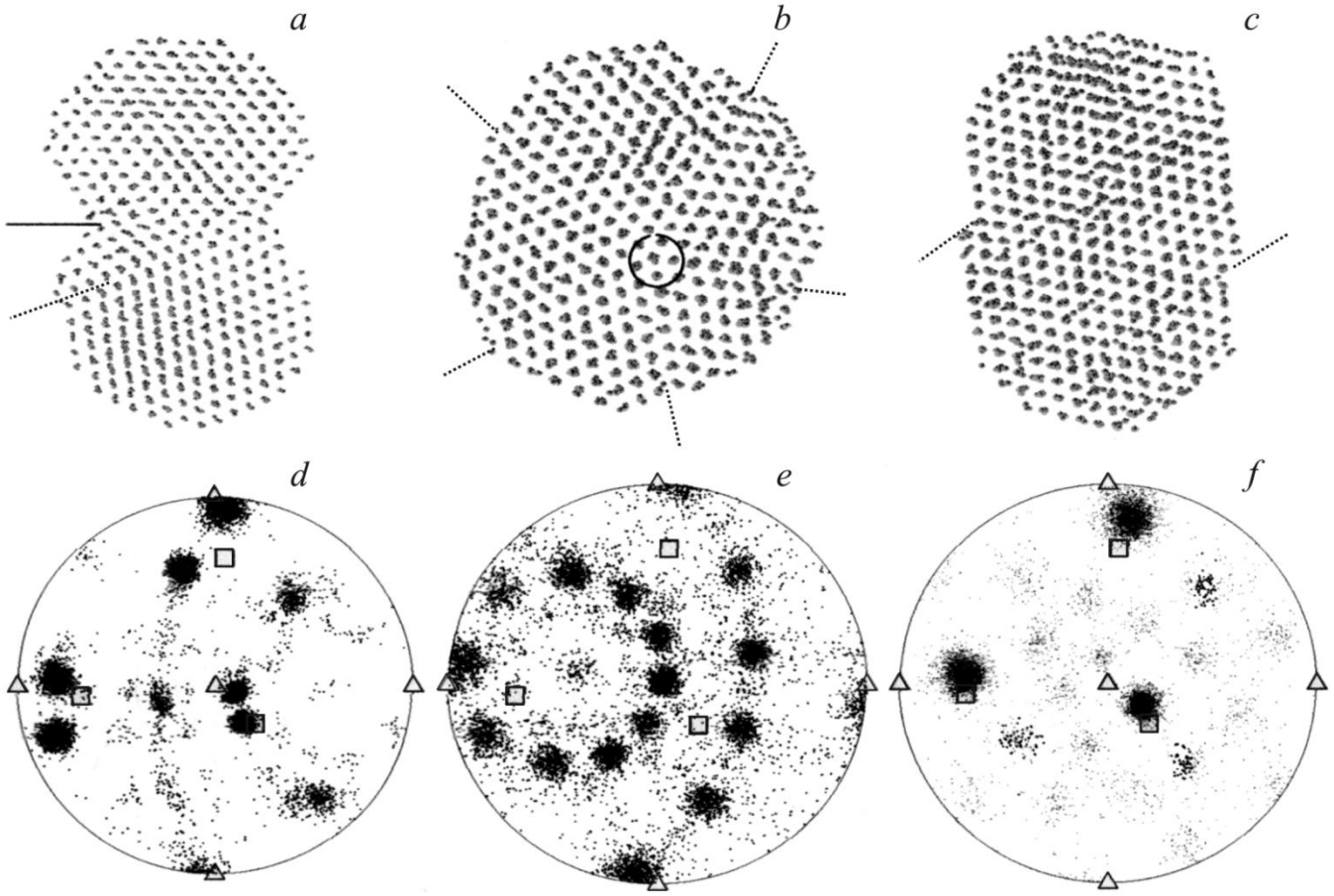
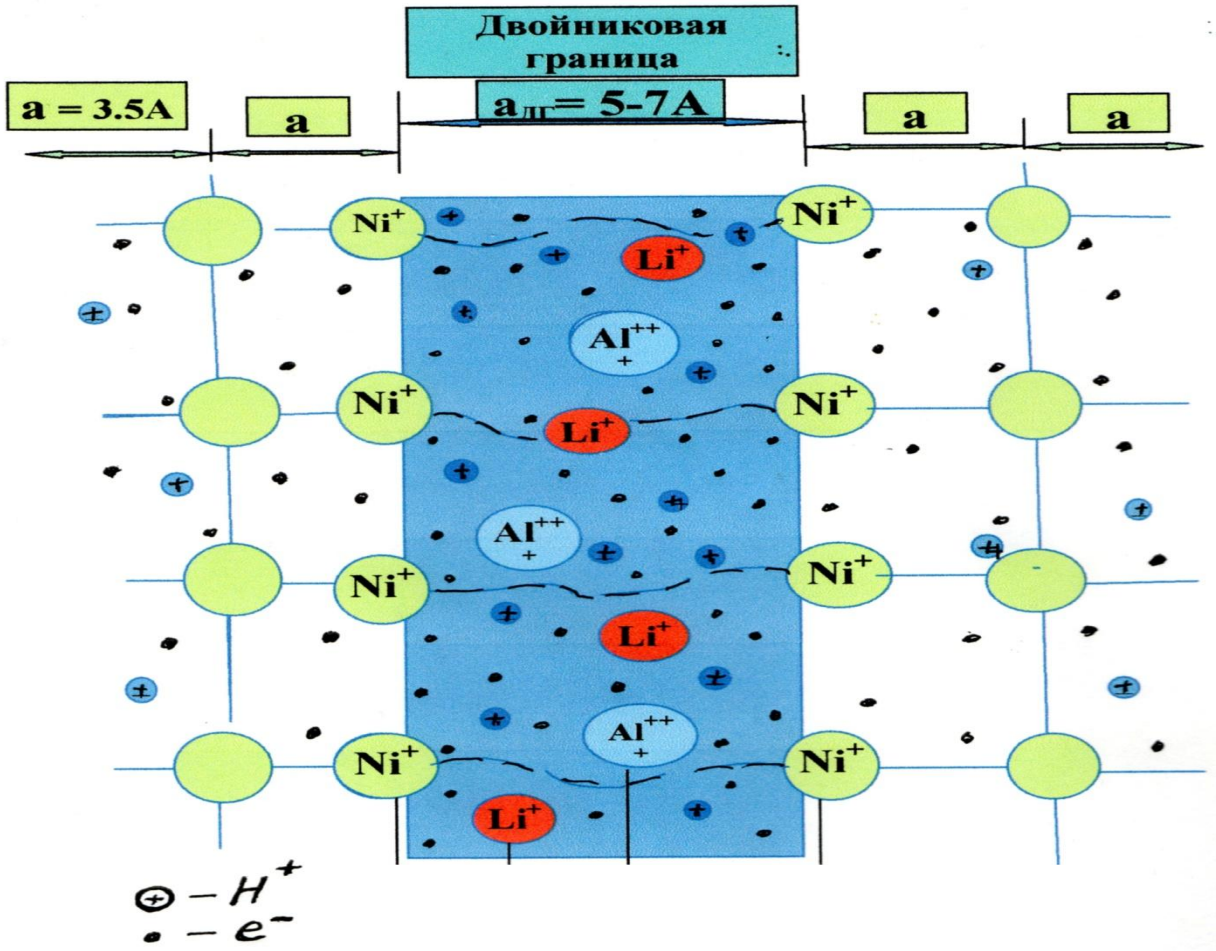


Рис. 1. Структура двух агломерирующих наночастиц после релаксации при МД-моделировании ($\Delta t \sim 200$ ps): *a, b* — асимметричная, *c* — симметричная $\Sigma 27$ ГЗ при температурах 780 (*a*) и 1350 K (*b, c*); *d–f* — распределение $\langle 001 \rangle$-ориентаций агломерирующих наночастиц на полюсной фигуре (001). Окружностью на части *b* выделена вершина стыковки пяти двойниковых границ; пунктирные линии показывают следы двойниковых границ на плоскости изображения.

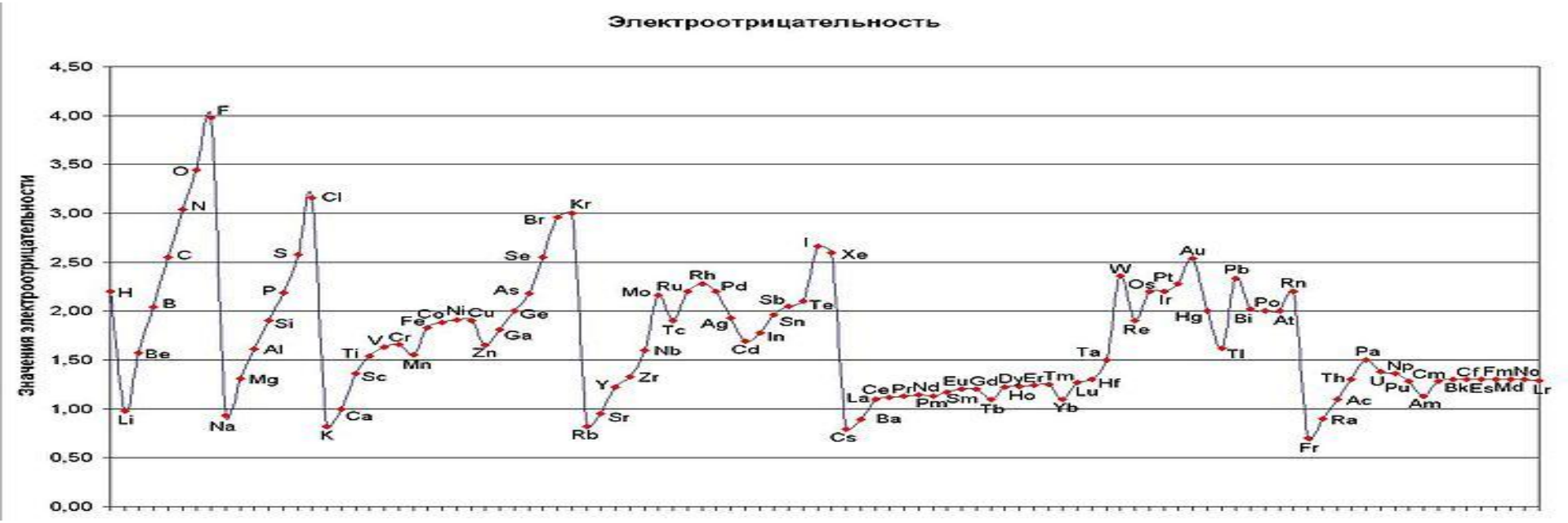
Then, after heating a mixture of (Ni + Li Al H4 T = 573 K) and dissociation activator (Li Al H4) - process will look.



Knowing

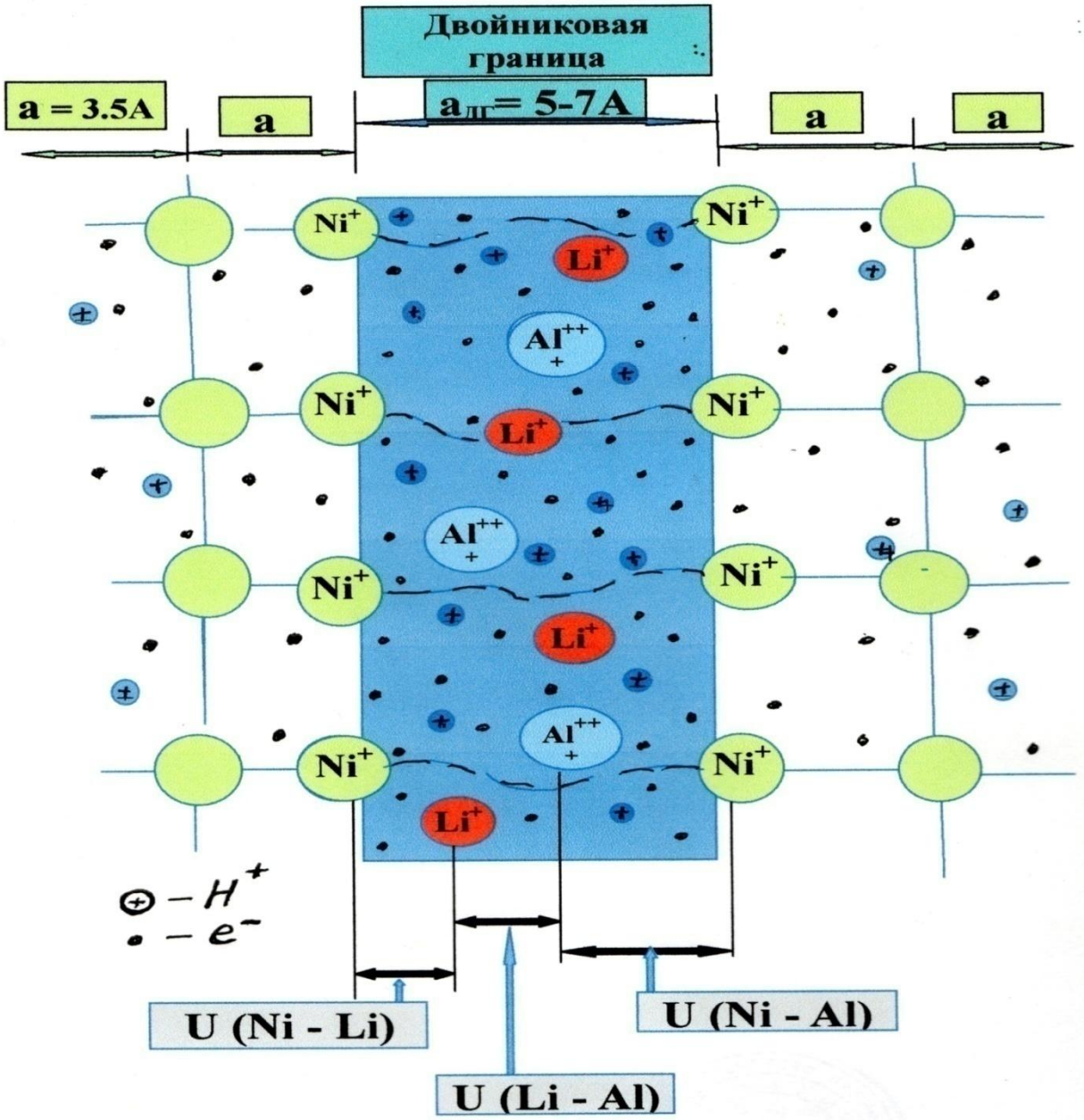
Электрохимический ряд напряжений металлов

Li	Cs	K	Ba	Ca	Na	Mg	Al	Zn	Fe	Co	Ni	Sn	Pb	H_2	Cu	Ag	Hg	Pt	Au
-3.04	-3.01	-2.92	-2.90	-2.87	-2.71	-2.36	-1.66	-0.76	-0.44	-0.28	-0.25	-0.14	-0.13	0	+0.34	+0.80	+0.85	+1.28	+1.50
Li^+	Cs^+	K^+	Ba^{2+}	Ca^{2+}	Na^+	Mg^{2+}	Al^{3+}	Zn^{2+}	Fe^{2+}	Co^{2+}	Ni^{2+}	Sn^{2+}	Pb^{2+}	$2H^+$	Cu^{2+}	Ag^+	Hg^+	Pt^{2+}	Au^{3+}



evaluate possible fields (E)

Consider a twin boundary (DG) as the electrochemical cell

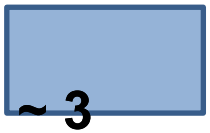


Then, the potentials in the DG are:

1. ΔU (H + - Li +) = 0 - 3,045V = - 3,045V
2. ΔU (Ni + - Li +) = 0,234V - 3,045V = - 2.8V
3. ΔU (Ni + - Al +) = 0,234V - 1,070V = - 0.8V
4. ΔU (Al + - Li +) = 1,070V - 3,045V = - 2B
5. ΔU (Ni + - H +) = = - 0,234V

Consequently, the strongest fields form: H - Li

A field strength (E) DG-in

Ni - Li  **~ 3**

E = ΔU / Ldg E = 3 / 2.10- 10

= 1,5.10 10 / M

Not taken into account in the process:

1. The thermal energy (kT) at 573 K for (e) DG - $E = 10^{8}$ V / m,

   which does not satisfy the conditions of synthesis of the muon.

2. The energy of the border AT =?, But it is there and,
   apparently, also insufficient.

Note that all the evaluations (E) are made to

stationary process.

An additional contribution is made

RESONANCE.

The appearance of an oscillatory process in

twin boundary (DG) with a frequency

$v = 10 \sim_{6}$ Hz = ~ 1 MHz

allows, in the presented model, hypothetically
implement this process.

Field E = 10 10 V / m at a distance a DW ~ 5 But according to resting

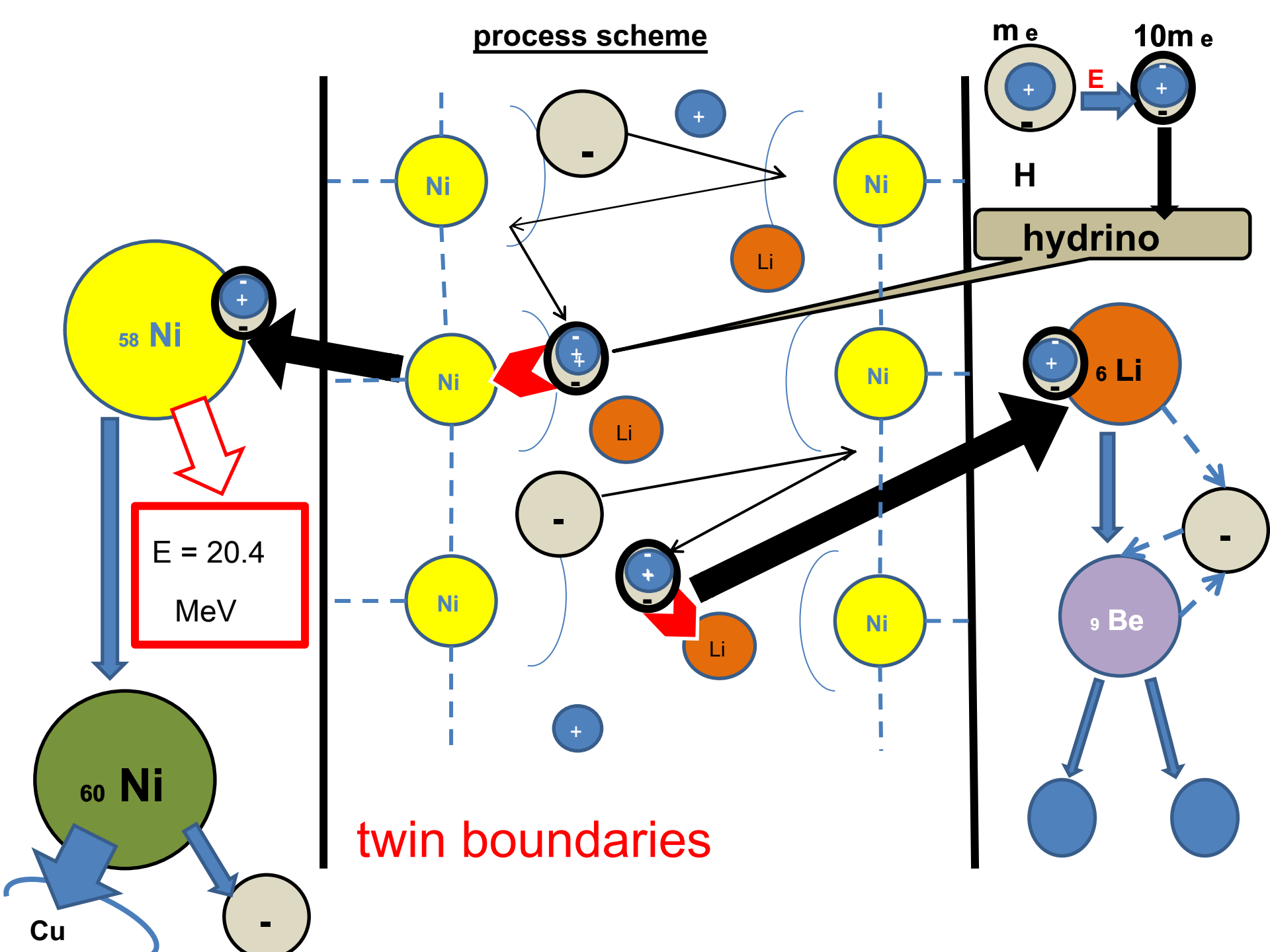
the electron energy and the F * AT = (eE) and DG ~ 7 eV .

1. This energy is sufficient to activate the transition to a hydrogen atom **hydrino** co for Mils (with a reduced radius of the electron). See. Evaluation NM Evstigneev, FS Zaitsev, AI Klimov, NA Magnitsky, OI Ryabkov. Mathematical modeling of the effect of releasing energy in the plasma vortex reactor. // DAN. 2013, t. 450, N 2, p. 154-157 12. Hydrinos exists, for example, in the muon catalysed (**p μ**).

2. To form **n** of **p** and **e** or early reactions similar **muon catalysis,** necessary to transfer the particles MeV-energy. This can be achieved due to the resonance effect on locked in DG **e** ~ 1 MHz wave with the electric field amplitude **E a ~ 10 kW / m .** There may be internal rate in the DW.

The probability of interaction (F) to obtain an efficiency of ~ 10 should be P = 10 ~ 14 reactions / sec.

The values of E a and U are quite reasonable.


process scheme
m e
10m e
E
H
hydrino
58 Ni
Ni
Li
6 Li
9 Be
E = 20.4
MeV
60 Ni
Cu
twin boundaries

Also e-mail to the frequency. magnetic action during "generator"

Rossi came in-district physicist

Lviv - F. Mikhailov.

It examines the process of chemotherapy (ie, Sat) at point defects - vacancies in the crystal lattice. However, the vacancy mechanism power can not be high since thermodynamic. neustochivy.

In addition introduced a magnetostrictive mechanism, but Ni

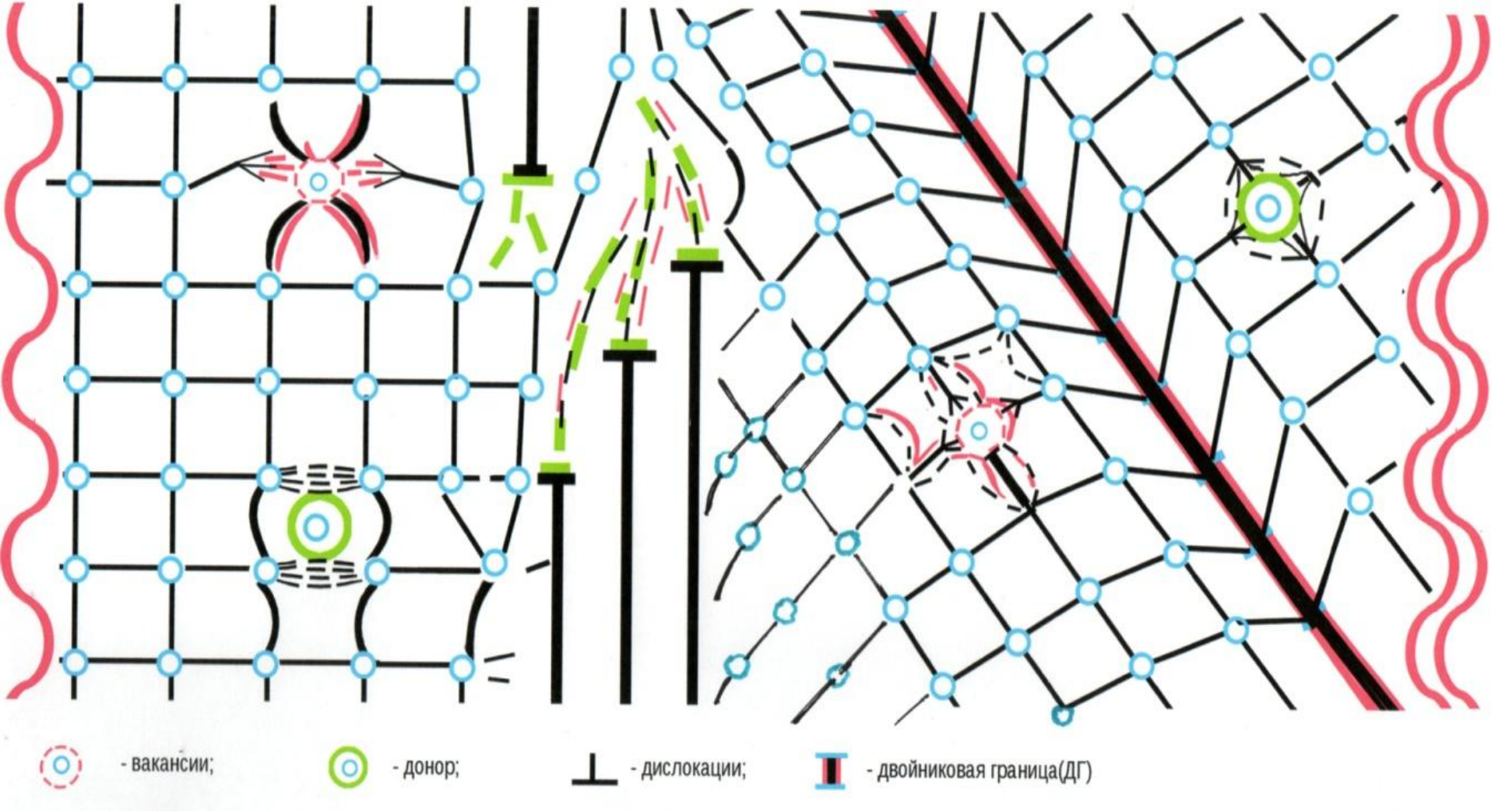
$$K_m = \Delta L / L = 3{,}5 * 10^{-5} \text{ at } T = 20 ^\circ C$$

which it is also a small contribution to this energy "generator", and when ↑ T -

K_m ↓. * - Curie point in $K_m = 0$.

In this study no fields estimates. The emphasis is on the physical - philosophical analysis.

Polycrystals.

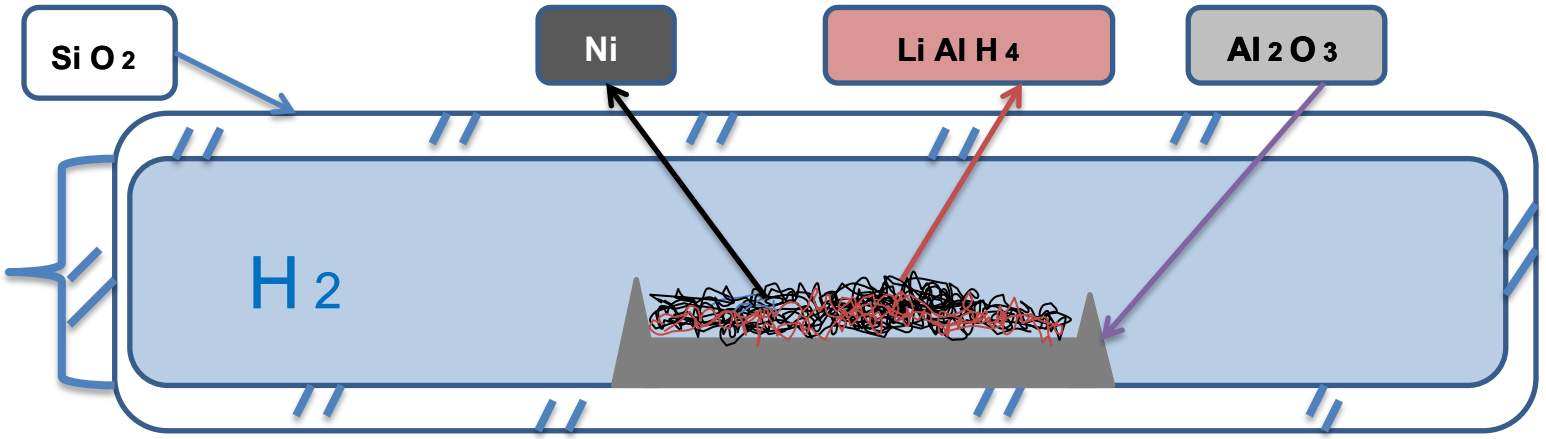


Prospective experiments to determine the allocation mechanism energy "generator" of Russia.

1. Simplified diagram of the "generator". Why repeat the whole scheme "generator" of Russia, if you need to find out, there is the release of energy or not.
2. To investigate the effect of DG crystal structure of nickel (Ni) in the energy process. X-ray diffraction analysis of the samples. Two Ni experiment with and without DG.
3. To investigate the effect of frequency and power of the electromagnetic radiation at the excitation process.
4. Take into account the enthalpy of the chemical. reactions by VL Bychkov. Theor. evaluation long aging process.

"Generator" simplified scheme.

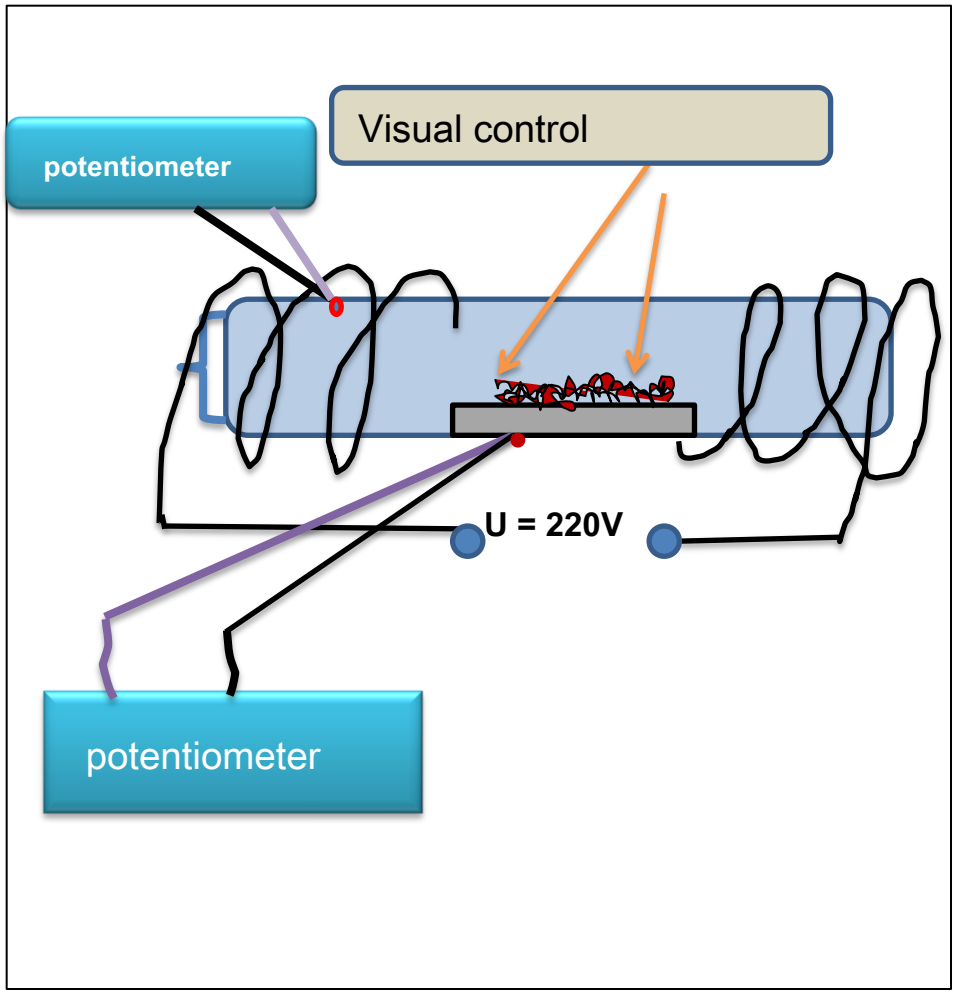
1. **All the preparations and components** research must satisfy the conditions of work **with High Purity in-you - OFS.**
2. In the boat of (**Al_2O_3 or SiO_2)** placed 10-50g nickel powder (**Ni)** with lithium aluminum hydride activator (**$LiAlH_4$).**
3. pumps with components placed in a quartz ampoule (**SiO_2).**
4. The process is conducted in a sealed quartz ampoule (**SiO_2)** previously evacuated and then filled with hydrogen.



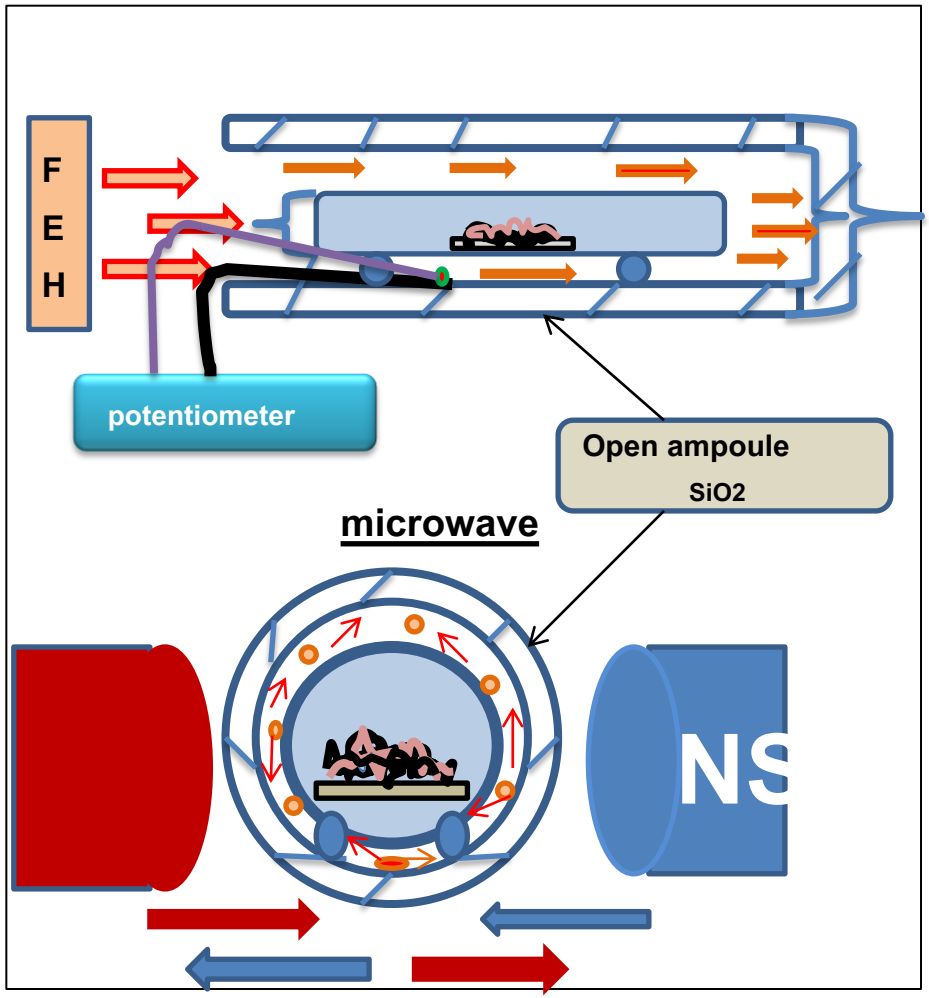
Carrying out the process by visual inspection

and control thermocouple

The use of resistive heating



Using the hot air and microwave



About the process:

Energy rating

During the transition **Ni 58** at **Ni 60** **E = 20,4** If MeV **P = 3,3kVt**

The probability of interaction (P) For a given energy, while

Efficiency = 11 shall be:

P = 10 ~ 14 interactions / from

Chem. evaluation

1. 50 g (58 g) **Ni --- 1 g / mol**

or **N_A = 6.023 * 10^{23} al.**

2. 1 year 3.1 --- * 10^{7} from.

Then during operation of the generator, with 100% utilization of Ni and Li

will be: t = 6.10^{23} / 1.10^{14} = 6.10^{9} T = 6.10^{9} s / 3.10^{7} from Ie = 200 years Rossi expects to use 1/7 of the original kompnentov.

Creating a DG in Ni crystal.

work hardening of the crystal

Work hardening (cold deformation)

possible to obtain

DG density

N_{AT} = 10^{6} - 10^{7} 1 / sq cm.

Then, in the first DG shall be **1 -**

taken 10 million / sec.

Powder Ni

powder **Ni 1 - 10 microns**

in the presence of the 1st DW 5 m

in the grain of their number to

be 50 g Ni

N_{AT} = 10 eleven 1 / sq cm.

Then, in the first DG should

be **1000 taken. / S**

Experiment strategy:

resistive heating

I. 1. Preparation of powder **Ni - 1-10mkm**

2. The average x-ray powder analysis.

3. Assembling the vial and heating the assembled quartz ampoules **Ni** catalyst powder and **Li Al H 4** before **300C.**

4. Monitoring the temperature of the thermocouple **T = f (t).** Diff. measurement.

5. Temperature rise in the ampule.

6. See. To claim 4.

II. Variations from the original - **Ni** and **Li Al H 4.**

(Size of rubbing, pressing ...).

III. RF and microwave exposure - f (v), f (P)

Analysis of passage reaction at T = f (t)

fen heating

Sections -. I., II, III.- not change, but these experiments are more clean for RF and microwave exposure.

Perhaps a resistive and hairdryers processes in parallel.

IV. You may have to enter a Ni cathode sputtering in an ampoule, but it leads to complication of the process.

conclusion

1. Made theoretical estimates of energy in the process of quasi-HT using the model - DG (twin boundary) show the feasibility of the process CNF or quasi-HT (LENR).

2. To test the quasi-HT process mechanism proposed a number of simplified, well-designed experiments with and without DG in OFS conditions (Otherwise the caulk DW).

3. For the implementation of the proposed program of experiments needed elaboration - the creation of a small group, supplies, equipment (electric installation, vacuum, kvartseduvnoe, the meter-ing.) And funding.

4. What is important is experience with high purity technologies - a large school. Desire will get LENR even with good funding is not enough.

PS

Until 1995, to begin such experiments could be 2-3 days after receipt of raw material - it Giredmet on OHMZ Giredmet,

in Inorganic Chemistry RAS, in VNIISIMS G. Alexandrov.

The philosophy of knowledge:

- *Never towering over nature, for you are her son.*

- *Learn it by all possible means.*
- *I feel that she likes, and play under it, not over it.*

- *Then Nature will reward all full.*