10th International Workshop on Anomalies in Hydrogen Loaded Metals

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Book of Abstracts

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Welcome to the 10th International Workshop!

Here is some information which I hope will make your participation at the Workshop more enjoyable.
There's a fairly standard regime every day. Starting times, coffee breaks, meals are always at the same time. Every presentation is 25 minutes long with 5 minutes for questions. As you can seen it's quite an intense program fitting some 50 oral presentations and many posters. Please be punctual! Moderators will strictly adhere to the time-table!
Presenters may either load their work onto the main computer or simply use a USB memory key (also on sale at reception). Any files left on the computer will be deemed submitted for publication of the Workshop DVD and later the ISCMNS web-site. Material may be modified or withdrawn at any time. There are strict requirements for naming files. You must use the filename designated displayed at registration and on the website at http://www.iscmns.org/work10/program.htm You may access the "Link" business center computers to make any last minute modifications to your presentations, or to access the Internet.
Please ensure all pages of presentations are numbered! This allows questions to be made to specific points.
There is time to relax too. Coffee breaks are 30 minutes long which allows you to chat, shower or wander round the gardens! Lunch is a generous 90 minute break! Workshop participants are entitled to all meals on the program. If you have any special dietary requirements, just ask.
Like many European countries, Italy has adopted laws which prohibits smoking in any building open to the public. If you need to smoke, please do so outside!
Reception will process your Workshop registration, issue attendance certificates, ISCMNS membership certificates, receipts for ALL payments (please insist on getting one!), and will sell DVDs, USB Memory keys, various conference proceedings in hard copy.

This workshop will publish its transactions on:-

1) The Workshop USB memory pen
2) The ISCMNS web-site www.iscmns.org/work10/
3) DVD

I hope you will find this workshop enjoyable and useful. If it is, the reason will certainly be the generous support of our sponsors (see front page) and the tireless efforts of the organizing committee and reception staff. A big thank you to you all!

Nuclear processes in metal-deuterium systems stimulated by radiation

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Electron beam and X rays stimulated yield of the products of nuclear reactions from deuterated palladium and titanium [1]. The charged particles energies and identities were determined using a set of accelerator calibrated CR-39 detectors covered with various metal foils. It has been established with reliable statistics that 30_keV electrons and X rays initiate the synthesis of deuterons in the Pd/PdO:Dx and Ti/TiOx:Dx systems with the yield of 3 MeV protons. It is important to note that the emission of 3 MeV protons is observed from sample sides which are irradiated and not directly irradiated by the electron beam. Mean free path of 30 keV electrons in Pd is of order of 1 μm, whereas the sample is 50 μm thick.

It is known that the accelerated electrons lose their energy in the metals mainly on excitation of valence electronic subsystem. However, a lifetime of the electronic excitations in metals is rather short (~10–15 s) and it is not clear how the energy from electron the subsystem is transferred to deuterium atoms. The answer to this question can be obtained by studying the evolution of electronic structure and excitation spectrum of metals in the process of their saturation by hydrogen (deuterium). The first-principle approach the electronic structure and spectrum of collective electronic excitations in palladium were calculated. There was found significant modifications in the absorption of hydrogen. Also it was shown that hydrogen significantly reduces the frequency of plasma oscillations of the valence charge density of the metal. This testifies that main part of the energy of ionizing radiation penetrating into the metal-hydrogen system are absorbed by the plasmon excitation. In turn, plasmons can serve as an effective mechanism for distribution of the energy over the entire sample with its predominant localization in the vicinity of hydrogen atoms. Theoretical calculations are shown that hydrogen atoms in metals are in a charged state, hydrogen (deuterium) charge in Pd is close to the nuclear charge of hydrogen (deuterium). The overlapping regions of high electron density with the region of localization of hydrogen atoms occurs Coulomb interaction between the negatively charged electron cloud (plasmon) and the positively charged hydrogen atom. As a result of this interaction, the hydrogen atoms acquire enough energy to fusion of deuterium atoms.

[1] I.P. Chernov, A.S. Rusetskii et.al., Journal of Experimental and Theoretical Physics, 2011, Vol. 112, No. 6, pp. 952–960.

The 2-d Energetic Revolution in Cold Nuclear Transmutation.

Heat Generator of Rossi & Focardi and its Theoreticial Erzion Model Interpretation

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We present a short review of Cold Nuclear Transmutation investigation for 22 years after its discovery. It is shown presentations materials of the 1-st world industrial variant of the Rossi & Focardi heat generator “E-cat” in Bologna – Italy with power up to MW based on Cold Nuclear Transmutation phenomenon. It is proposed the Erzion model of Catalytic Nuclear Transmutation for the theoretician interpretation of E-cat.

Registration of radiation and thermal effects at saturation $LaNi_{4,75}Al_{0,25}$ by hydrogen

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The results received in the course of saturation of powder $LaNi_{4,75}Al_{0,25}$ by protium and deuterium mix in a various parity at rise in temperature to 700 C and its decrease to 30 C are presented. Measurements of temperature, pressure, x-ray, gamma and neutron radiations were carried out during experiments. Received results are analyzed.

Subbarier Nuclear Interaction of Channeling Particles at Self-Similar Formation of Correlated States in Periodically Strained Crystals

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The methods of optimization of nuclear processes at interaction of low energy proton or deuteron beams with oriented crystal targets are considered. These methods are connected with the peculiarities of coherent correlation effects at oriental motion and channeling of charged particles in crystals. It was shown [1,2] that the use of moving particles in a coherent correlated state leads to great increase of the probability of a tunneling effect and the possibility of penetration of channeled particles in the space under the barrier (walls of crystal channel). Similar processes of optimization of controlled fusion in crystals (but without the use of coherent correlated states) were examined [3,4] 7-8 years before historical experiments of Fleischmann and Pons.

In the report a lot of methods of optimization of inter-nuclear interaction with the participation of moving particles and crystal matrix nuclei are discussed. It is shown that the use of periodic or asymptotic spatial modulation of channel wall height leads to the formation of coherent channeling state of moving particles in each crystal channel. Formation of such state changes the process of interaction of these particles with nuclei and greatly increases barrier transparency. For the channeling such mode can be formed using longitudinal acoustic running or standing waves along the channel axis. This wave changes the distance between nuclei and, accordingly, modulates the height of channel walls.

The additional method of formation of coherent channeling state of moving particles is connected with "parametric channelling". Such method takes place for moving charged particles with internal energy structure. Features of this mode of motion are associated with the strong parametric coupling of orientational oscillations in channel and vibrations caused by intraparticle processes.

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[2]. Vysotskii V.I., Vysotskyy M.V., Adamenko S.V. Subbarier channeling particle interaction under self-similar exitation of correlated states in periodically strained crystal // Journal of Surface Investigation. X-ray, Synchrotron and Neutron Techniques, 2012, Vol.6, No.4
[3]. Vysotskii V.I., Kuzmin R.N. Reactions of controlled fusion in crystal targets //Letters to Journal of Thechnical Physics (Soviet Phys. -J.T.P. Letters), v.7, #16, 1981, p. 981-985
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Summary of the latest results of gas loading experiments

A. Kitamura[1], Y. Miyoshi1, H. Sakoh[1], A. Taniike1, A. Takahashi[2], R. Seto[2], Y. Fujita[2], T. Murota[3] and T. Tahara[3]

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Gas-phase hydrogen isotope absorption/adsorption experiments performed since 2008 at Kobe University are briefly reviewed. The samples include 0.1-μm-diam. Pd particles (PP, Nilaco Corp.), Pd-black (PB, Nilaco Corp.), nano-composites of PdO and ZrO_2 (PZ, Santoku Corp.), porous-silica-included Pd nano-particles (PS, Admatechs Co. Ltd.), ternary oxide compound of $PdO{\cdot}NiO{\cdot}ZrO_2$ (PNZ, Santoku Corp.), and binary oxide compound of $NiO{\cdot}ZrO_2$ (NZ, Santoku Corp.), and PdO·NiO nanoparticles dispersed in ZrO_2 powders provided by B. Ahern (PNZ2B).

A twin absorption system [1] consisting of two equivalent sets of reaction chambers and the reservoir tank filled with D_2 and H_2 gas, respectively, has been employed. Time-dependent measurements of the temperature and the pressure enable measurements of time-dependent specific heat release E, dynamic loading ratio L_D (L_H) of hydrogen isotopes, dynamic sorption energy η_D (η_H), as well as time-integrated parameters such as hydrogen isotope loading ratio D/Pd (H/Pd) and hydriding energy Q_D (Q_H). Radiation detectors, such as a neutron doserate meter, an ion-implanted Si detector and a Si-PIN diode are also provided for time-dependent measurements of neutrons, charged particles and X-rays.

Based on the results of the extended measurements, the effects of the sample structure on the absorption/adsorption characteristics are discussed; particle size, oxide formation on the Pd samples, the silica-inclusion of Pd nanoparticles, and Ni-substitution for Pd. In particular, anomalous results have been repeatedly observed in the heat evolution, the total D/Pd (H/Pd) loading ratios and the η-values, which were significantly enhanced with isotopic (D or H) differences for the nano-particle samples dispersed in ZrO_2 or included in porous-silica.

Recently, we have started examining performance of a Pd-free sample; a ternary compound of $Cu\text{-}Ni\text{-}ZrO_2$ (CNZ, Santoku Corp.). Since the sample absorbed negligible amount of hydrogen isotopes at room temperature, the absorption runs were done at elevated temperature up to 570 K. From time-dependent measurements of the pressure and the sample temperature in comparison with the He blank runs, time-integrated specific heat release and hydrogen isotope loading ratio D/Pd (H/Pd) were deduced. The preliminary results show that the sample could be exothermic in the initial sorption ("transition") phase in some temperature range between 470 K and 570 K, giving moderate values of D/Ni (H/Ni) and η_D (η_H) comparable to those by Pd-based samples. Extensive work is necessary to confirm reproducibility.

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Charged particle emission from $Ti/TiO_2:D_x$ system stimulated by X-ray radiation

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The yield of energetic charged particle emission from $Ti/TiO_2:D_x$ samples stimulated by X-ray radiation has been observed using CR-39 track detector.

Samples of Ti/TiO:Dx of 1x3 cm^2 size were prepared from 300 μm titanium foil, oxide layer TiO ~ 25 nm. The samples were electrochemically loaded in 1M D_2SO_4 solution in D_2O. The concentration x = D / Ti ~ 0.1 was reached at the depth of ~3 μm in 24 h (at current density ~10 mA/cm^2).

Then the samples were placed between two CR-39 track detectors with different Al filters (11 and 55 μm) and irradiated in X-ray beam (U = 120 kV, A = 5 mA) during 4 h.

Energy determination and particle identification was based on calibration CR-39's produced in a Van De Graaf accelerator (by normal incidence proton beams with the energy ranging 0.6-3.0 MeV,) and cyclotron (alpha-particle beams with the energy ranging 10 – 30 MeV).

We observed statistically significant emission of 3-MeV protons (DD-reaction products) as well as the emission of alpha-particles in energy range 10 – 17 MeV (from some unknown nuclear reactions).

Are Ni + H Nuclear Reactions Possible?

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Various cases of possible orthodox nuclear reaction processes, including newly proposed 4H/TSC fusion by simultaneous weak and strong interactions, 4H/TSC + Ni induced fission products, Ni + p reactions and reaction by deuteron impurity, are comparatively discussed for feasibility.

1) Ni + p nuclear reaction is impossibly difficult to make the Coulomb-field penetration of proton through so many inner electron shells (K, L, M), usually non-active in chemical reactions, of Ni-atom. And the proton capture with Ni-nucleus, if any, should emit lethal prompt gamma-rays which have never been observed. So, this type of nuclear reactions is unlikely.
2) Deuteron impurity (1/67000 in H_2 gas usually) may induce (3H+D)/TSC fusion to be considered. Conditioning of 3-dimesional symmetry of QM-wave function for TSC is however of problem to condense into microscopic neutral entity small enough for causing any strong interactions.
3) The newly proposed (at JCF12) 4H/TSC WS (weak-strong interaction simultaneously) fusion is a plausible scenario to have clean products (^{3}He and proton) with somewhat enhanced reaction rates in Ni-nano-particles, for rare-conditioned (to be discussed) visible heat generation with very weak secondary neutrons (10^{-13} order of ^{3}He primary product) and gamma-rays (10^{-12} order of ^{3}He primary product). Degrees of the generation rate of 4H/TSC (t=0) transient clusters in Ni-H nano-particles and the life-time elongation of 4H/TSC-minimum state are to be studied.
4) The 4H/TSC + Ni-isotope capture-and-fission process, previously proposed in our paper of JCMNS Vol.1, pp.86-96 (2007) is another plausible scenario, to result in generation of clean fission products in A<60 mass region. More enhanced 4p + Ni to fission rates than the previous prediction is expected due to the possible elongation of 4H/TSC-minimum-state life time without complete nuclear break-up of the symmetric cluster under dynamic condensation.

Critical discussions for other proposed models will be done also within allotted time.

Nuclear reactions in condensed matter

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This paper focuses on the main features of the tunneling between two deuterons within a lattice. Considering a "screening effect" due to lattice electrons, d-d fusion rates are compared as evaluated from different authors, assuming different screening efficiency and different d-d potentials.

Further, an effective potential is proposed which describes very well the attractive contribution due to plasmon exchange between two deuterons. By means of this, d-d fusion rates are computed for different energy values. Finally, a good agreement between theoretical values and experimental results proves the reality of cold fusion phenomena and the reliability of the model which is presented here.

The coherence model of condensed matter affirms that within a deuteron-loaded palladium lattice there are three different plasmas: electrons, ions and deuterons plasma.

Excess Heat in a Long Thin Pd Tube with Deuterium Flux at Room Temperature

--- A New Method of Calibration ---

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Gas-loading experiments using deuterium and palladium have been conducted for 22 years at Tsinghua University since 1989. It evolved from low temperature-high pressure (77K, 9 atm.) to high temperature-low pressure (140ºC, 80kPa). The most important finding was the correlation between excess-heat and the deuterium flux at the temperature higher than the boiling temperature [1]. The configuration evolved from thin Pd film to long-thin Pd tube. The length of the palladium tube evolved from 26mm to 400mm. The number of palladium tubes evolved from 1 to 5. The direction of deuterium flux evolved from outward to inward through the thin wall of the palladium tube. The calorimeter evolved from the Seeback type to Comparative calibration type. A new result of correlation between excess heat and deuterium flux at room temperature would be presented in details.

A short copper tube is weld between two pieces of palladium tube. The above figure shows the temperature difference between Pd and Cu tubes while the deuterium pressure is 80kPa outside the Pd tube. The pressure inside the Pd tube is shown by the right ordinate (black). The first spike of temperature difference (red) in 40 seconds is caused by the heat of formation ($^{235}_{92}$0.2eV per d-atom in Pd) and the slow ramp-up in 24 hours is induced by the deuterium flux. A qualitative calculation based on this fast spike and slow heating process induced by deuterium flux shows that the excess heat must be non-chemical origin.

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Nuclear Transmutation on a Thin Pd Film in a Gas-Loading D/Pd System

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When deuterium gas permeates through a thin palladium film, it was thought as a diffusion process only. However, after ~80 times absorption and desorption processes accompanied with permeations, nuclear transmutation was discovered on the surface of palladium film using SEM (scanning electron microscopy). At first glance, it was noticed that the macroscopic deformation of palladium was so large that the palladium film might increase its thickness while decrease its diameter of a rounded palladium film. The stress at the rounded sealing line might be so strong that it even cuts the palladium film into two pieces: the central rounded piece and the ring-shape edge piece. SEM analysis revealed that new elements (Cu, Zn, Si, etc.) were detected in the permeation area, but there were no such elements in the original palladium film or in the ring-shape area where no deuterium permeation happened. The temperature of palladium film was much higher than that of Iwamura experiments in Advanced Technology Research Center, Mitsubishi Heavy Industries. Besides, there was no super lattice on the surface of our palladium films. Metallography analysis will be shown as well.

"Theory of Bose-Einstein Condensation Nuclear Reactions in Deuterium/Hydrogen Loaded Metals"

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Over the last two decades, there have been many publications reporting experimental observations of excess heat generation and anomalous nuclear reactions occurring in metals at ultra-low energies, now known as 'low-energy nuclear reactions' (LENR). After a review of the key experimental observations, theoretical explanations of the LENR phenomena will be described based on theory of Bose-Einstein condensation nuclear reactions (BECNR) in micro/nano-scale metal particles [1-12].

The BECNR theory is based on a single basic assumption capable of explaining the observed LENR phenomena; deuterons in metals undergo Bose-Einstein condensation. While the BECNR theory is able to make general qualitative predictions concerning LENR phenomena it is also a quantitative predictive physical theory. Proposed experimental tests of the basic assumption and theoretical predictions [11,12] as well as potential application to cryogenic ignition of deuteron fusion in micro/nano-scale metal particles [12] will be described. Possible applications of BECNR to Ni-H systems [13,14] will be also discussed in terms of generalized BECNR theory involving two species of Bosons [7,11].

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The Experiments with Bismuth Salts in Aqueous Solution and New Ideas for CMNS Explanation

Baranov D. S., Baranova O.D.

According to data obtained in experiments with aqueous solutions of bismuth salts ^{210}Bi, ^{212}Bi, ^{214}Bi and the isomer of $^{212}Bi_{m1}$ (excitation energy 250 keV) was observed. Generation of isotopes is accompanied by a departure from the sample of streams of macroscopic particles (~ 5 microns).
Based on the analysis of experimental data obtained in the experiment with the salts of bismuth, attempts to prove the existence of long-lived nuclear molecules are discussed. It seems that the object consisting of nuclei is associated with magnetic and nuclear forces.
Properties of long-lived nuclear molecules are discussed [1-3]. The CMNS experiments were analyzed by taking into account the formation and decay of long-lived nuclear molecules.

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Low Energy Nuclear Transmutation is the Way for Remediating Waste Radioactivity

I.Goryachev, I.Goryacheva, V.Kuznetsov

At present intensive investigations are being carried on in many countries with a view to developing effective methods of treating radioactive waste (RW). In most cases those works are aimed at providing isolation of RW from environment and long term safe storing RW of different origination. One of the directions of developing such technologies with application to low and intermediate level RW stipulated significant decreasing of the waste initial volume and converting it into a form suitable for disposing of it for long term storage.
It is recognized now by many specialists that the most perspective technology for solving this problem is the technology of plasma pyrolysis of the organic components and melting inorganic part of RW and converting it into the form of vitrified slag. Provided the appropriate technical solution implemented the technology stipulates incorporating (capturing) 90-95% of the entire radioactivity of the waste material inside the vitrified slag as well as actual absence of dangerous discharging of radioactive and other hazardous products into the atmosphere.
Such technology has been developed in Russian Research Center "Kurchatov Institute" and realized in Russia in cooperation with Scientific and Industrial Association "Radon" at two pilot facilities – installations "Pyrolis" and "Pluton" – and at present, based on those two installations, a number of new facilities of higher capacity for processing RW at nuclear power plants and processing waste of different originations. It is wirth to note that these Russian facilities obtain a number of significant advantages as compared to other known installations implementing analogous technological principles, in particular, the "PACT" installations developed and manufactured by the "Retech" US company.
However, even these sophisticated installations do not solve completely the problem of RW remediation since the secondary product of plasma processing, though being highly stable, nevertheless remain radioactive and hence needs special handling and storage space.
Meanwhile, thanks to the success in research of low energy transmutation of nuclei of chemical elements, now there has appeared a possibility of solving the problem of utter remediation of RW. The results of experimental and theoretical research of a group of Russian scientists at the Dubna Center of Applied Physical Research (published in the journal "Annals de la Fondation Louis de Broglie", vol. 28, № 2 2003.
http://FondationLouisdeBroglie.org Article: Low Energy Transmutation of atomic Nuclei of Chemical Elements by V.Kuznetsov et al.) allow to hope that the newly discovered method of electromagnetic impact on radioactive materials that results in transforming unstable isotopes into stable ones and such process is not accompanied with any ionizing irradiation. It was determined that low energy transmutation is actually a threshold nuclear reaction of resonance nature and of exothermic type which makes it energetically advantageous. According to their findings in order to initiate reaction of transmutation radioactive material is placed into special reactor and subjected to irradiation with electro-magnetic energy of specific frequency, amplitude and topology. The authors of that discovery determined that the process of transmutational processing RW may take from decades of minutes to several hours depending on the isotopic composition of radioactive compound and its concentration. The highest efficiency of the process is to be achieved when working with concentrated mixtures.
Such conclusion makes it reasonable to stipulate that the most effective approach towards RW remediation may become combination of the above mentioned plasma processing technology which provides concentration of dissipated radioactivity into slag compound thanks to the capability of the plasma process to capture most of the radioactivity provide almost 100-fold shortage of the slag volume as compared to the initial volume of the material accepted for processing, - combination of the same with the process of stabilization of the radioactive slag in special transmutation reactor. The design of such reactor has been developed. The task of today is recognized to be practical creation of an experimental unit of such reactor based on the principles found by Russian scientists.

Anomalous excess heat during absorption of hydrogen in: Pd-Ni-Zr02 nano powder

Jean-Paul Biberian
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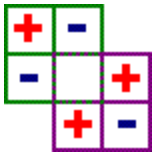
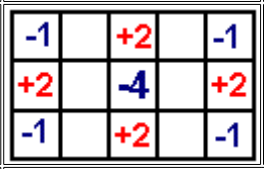
Absorption of hydrogen at room temperature in a Pd-Ni-ZrO2 nano powder produced 10 kJ of energy, equivalent to an energy of 4.1 eV per hydrogen atom. At higher temperatures, no excess heat was observed, probably because the hydrogen did not come out of the powder under vacuum at any temperature. When the cell was opened to air, the powder became red hot due to the oxidation of the hydrogen by the oxygen of the atmosphere. After replacing the powder in the calorimeter, no excess heat was observed at any temperature. In this talk, we will describe the mass flow calorimeter that can operate from room temperature to 700°C.

New methods for estimating atomic weights far from stability William Collis

In 2009[6] we illustrated improved Garvey-Kelson like local mass relations. One of these demonstrated a vanishing model error for heavier even-even isotopes. That is to say, the error in estimating atomic masses could be entirely accounted for by the declared experimental error. Encouraging though this result may have been, it is not always a useful method, because frequently the unknown masses of interest lie towards the drip-lines where neighboring masses too are unknown. In this paper we show new local relations which from which generic global equations, using point functions can be derived. These new global relations are more accurate than the Garvey/Kelson and Janecke/Masson equivalents.

	Local Relation	Global Relation (2120 isotopes)

	Diagram	Model Error kev	Number of Parameters	Terms satisfying Local Relation	Model Error kev
GKT	 Classical Garvey Kelson transverse local relation	216	509	$f_Z(Z)$, $f_N(N)$, $f_A(N+Z)$ Janecke / Masson formula	329
New		82	513	$f_Z(Z)$, $f_N(N)$, $Nf_{NZ}(Z)$, $Zf_{ZN}(N)$, odd	174

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Experimental results on sub-micro structured Cu-Ni alloys under high temperatures Hydrogen/Deuterium interactions.

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In the framework of studies devoted to detect thermal and/or nuclear anomalies during the close interactions of Hydrogen and/or Deuterium with protium-absorbing materials (e.g. Pd, Ni, Ti, Th, U, Fe, rare-earths, pure and their alloys), since March 2011, we made several experiments with a specific commercial alloy (ISOTAN 44) with nominal composition: Cu_{54}-Ni_{44}-Mn_1.

The original smooth surface of such material, in the form of thin wires (length 80cm, diameter 200μm; weight<200mg), was deeply modified in order to get sub-micrometric structures.

The outer thickness of nano-micro structured material was of the order of 20-30μm. The structures, as observed by SEM, are of *Skeleton type*. The apparent dimension of the materials ranged between 50 and 1500nm. The local (2-5μm islands) composition (by EDAX micro-analysis) of such skeleton material is, very often, different from the mean nominal one.

The modifications were obtained by the combined effects of quite high temperatures (Joule heating), in oxidizing atmosphere, and very fast cooling. In some aspects, it is similar, but at lower intensity (lower cost), to the procedures adopted by Yoshiaki Arata (Osaka University, since 2002) of melt-spinning and quenching for the preparation of his ZrO_2(65%)-Pd (35%)alloy. Now, such procedure is routinely used, even with large improvements, by A. Takashi-A. Kitamura group.

Some of this skeleton wires get a further, very light, coating by mixed salts of few elements (the main is Pd at concentration as low as 0.1%).

Such wires, with and with extra coating, were covered by (high temperatures) insulating sheaths and put inside a reaction vessel (made of Schott Duran glass).

It was added also another Pt wire, similar dimensions, used for reference purposes.

The system was pressurised (up to 8 Atm.) with several pure gas (He, Ar, Xe, H_2, D_2) or their mixture: were observed thermal anomalies, if any, starting from wires temperatures of the order of 200°C. It was adopted usual flow calorimetry.

After several calibration procedures and some, not stable, thermal anomalies, the best results up to now found was an excess power, of the order of 4-8W, lasting for over 4 weeks. The input power for Joule heating was of the order of 50-60W. The wire temperature was of the order of 500°C. Such results were found when the wire used was that provided of nano-micro structures with the surface nano-coated. The gas atmosphere was base on Hydrogen. Weaker effects found with D_2.

The large anomalous heat was linked to a quite strange behaviour of the wire itself: his resistivity versus temperatures changed from the usual Positive Temperature Coefficient (PTC) behaviour to Negative Temperature Coefficient (NTC). Hopefully, such simple behaviour can be used as quality parameter to select systematically compounds able to produce anomalous heat.

It is intriguing to consider that also the Takahashi-Kitamura group got thermal anomalies, with a compound of Ni-Cu dispersed in a ZrO_2 matrix, starting from temperature of 200°C (studied up to 300°C).

Control of excess heat production in Pd-impregnated alumina powder

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Abstract
We carried out an experimental study of excess heat production during deuterium loading of Pd-impregnated alumina. Earlier studies [1,2] have shown that a hydrogen-deuterium (H/D) exchange chemical reaction can account for at least some of excess heat observed during gas-loading experiments. In this work we show that excess heat contributed by H/D exchange can be eliminated by prebaking the material in vacuum at 390ºC, due to the removal of residual water from the material. After the material is given the opportunity to reabsorb water from air the reaction and excess heat production in the presence of deuterium resumes. Our calculations on the energy available from H/D exchange show that all the excess heat observed during our experiment can be accounted for by this chemical reaction.

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Effect of temperature gradient on calorimetric measurements during gas-loading experiments

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Abstract

We studied the influence of the temperature gradient on heat measurements during gas-loading experiments. We conducted our experiments in quasi isothermal chamber that is built to keep the inside temperature uniform. However, when experimenting at the elevated temperatures above 200˚C certain nonuniformity induced by the air flow inside the chamber produces local hot and cold spots.

The sample vessel inside the isothermal chamber then went through hydrogen and deuterium pressurization/depressurization cycles to detect any temperature change due to gas-loading process. The presence of gas changes drastically the heat conduction inside the vessel; therefore, when under pressure, the temperature probe couples to the hot or cold spots more efficiently than when under vacuum. This coupling effect artificially shifts the measurement baseline up or down, which could be mistaken for excess heating or excess cooling.

We simulated heat and cold spots by placing a resistor or Peltier element on the surface of the sample vessel that was later pressurized with hydrogen or helium. We observed both up and down temperature baseline shifts which were independent of gas used in the experiment. In addition we used heat sleeve that sometimes used for gas-loading experiments at elevated temperatures. The heat sleeve also showed the temperature baseline shift during the measurements.

We conclude by emphasizing the importance of the measurement system testing with inert gas (preferably helium due to its close to hydrogen value of thermal conduction coefficient) to eliminate the measurement error induced by temperature gradient.

Search for excess heat in metals exposed to pulsed hydrogen plasma

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Pulsed plasma cells have previously been shown to produce significant amounts of tritium. [1] In this work we report on the search for excess heat from similarly constructed cells operated in a pulsed hydrogen plasma. Results obtained using various hydrogen isotope combinations and metals are discussed.

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