Modern-Day Alchemy:
A Survey of Transmutation Experimentalists

The Merriam-Webster dictionary defines alchemy as "a medieval chemical science and speculative philosophy aiming to achieve the transmutation of the base metals into gold, the discovery of a universal cure for disease, and the discovery of a means of indefinitely prolonging life." Well, at least science is in the definition, even if the editors assumed that transmutation was merely speculative.

Making the case for ancient alchemy has been difficult for many academics, due in part to the fact that most early alchemical texts (and other books) were destroyed. Of those that remained, the text was written in such a way to make historical interpretation difficult. Often obsessed with or held to secrecy by benefactors/kings, alchemists produced texts that were perhaps purposely religious, allegorical and metaphorical. (Were the authors reporting on actual conducted experiments, or ideas of experiments? Were some texts interpreted as alchemical but were not, and were some that have never been interpreted as alchemical actually intended to be? Most importantly, what treasure troves of knowledge were lost when libraries were destroyed throughout history?)

The ancient alchemists most of interest to us at *Infinite Energy* are those who focused on the transmutation of base metals. Most pursued the production of gold, a sign of the times that has captured the imagination of some for thousands of years. Though gold has an economic value today of over $1,200 an ounce, it had more societal "currency" then. Gold was literally used as currency, even before gold coins were first minted around 700 BC. Because of its rarity and beauty, gold became a symbol of royalty, power, influence and wealth (even becoming important in religion). The quest for gold in ancient and modern times took different routes, for sure. Then, kings would just as soon force a scientist or priest, with the threat of death, to attempt to transmute metals into gold. Today, if a scientist claims to have transmuted metals into gold (or, to have transmuted any element into another) it is not given any attention or taken seriously.

Most modern day alchemists are not focused on making gold. Some have produced gold, but not in quantities that make the process fiscally viable. In the cold fusion field, transmutation of heavy elements has become commonplace. *Infinite Energy* founder and editor, the late Eugene Mallove, wrote in his Issue 44 editorial (2002), "It not easy to find a field that has opened wide more of Nature's doors than cold fusion." Mallove wrote a feature on John O'M. Bockris, "The Triumph of Alchemy" (Issue 32, 2000), in which he said: "Radioactivity could be reduced or destroyed...and new stable elements and isotopes across a vast spectrum of atomic mass could be produced in heretofore exclusively chemical experiments. Had scientific alchemy risen from the grave—from its earlier death at the hands of 20th century establishment science?"

Modern day alchemists have taken transmutation to a new art form. They are mainly interested in the *fact* of transmutation, not the promise of financial gain. Transmutation experimentalists want to understand the structure of nuclei, as well as explore the fundamental processes of life.

We asked a number of transmutation colleagues, all of whom have had experiments showing successful transmutation of elements, to answer a few questions related to transmutation. The six respondents are mostly academics with 30 years of transmutation results.

Jean-Paul Biberian is an independent researcher and retired physics professor (University of Marseille Luminy, France). Edward Esko designed the Quantum Rabbit transmutation experiments discussed in the survey, and is founder of Zpalladium, a new venture designed to commercialize low energy transmutation. Yasuhiro Iwamura is a research professor in the Condensed Matter Nuclear Reaction Division of Tohoku University's (Japan) Research Center for Electron Photon Science. Xing-Zhong Li is professor emeritus of physics at Tsinghua University (China). Tadahiko Mizuno is an executive at Hydrogen Engineering Application and Development Company and was professor of engineering at Hokkaido University (Japan). Vladimir Vysotskii is head of the Theoretical Radiophysics Department and professor of radiophysics, electronics and computer systems at Kiev National Shevchenko University (Ukraine).

Briefly summarize the most profound transmutation results you have directly produced.

Biberian: I have made several experiments showing that transmutation exists. My first set of experiments show transmutation was made with biological transmutations with seeds, bacteria and algae. I have observed systematically a decrease of silicon and an increase of calcium, but also changes in other elements.

With exploding wires of titanium in water with uranium salt, we have observed a decrease of U-238, but no change in U-235, therefore an enrichment in U-235.

I have analyzed by ICP-MS a palladium cathode and observed the creation of Ag-107.

Using a microwave generator I have produced a plasma with carbon powder. After analysis by ICP-MS, I have observed a large number of transmutations.

Esko: Quantum Rabbit results are summarized in our books, *Corking the Nuclear Genie* and *Cool Fusion*. One powerful result was the apparent transmutation of zinc and sulfur into palladium under vacuum and at relatively low temperature. About 50 to 60 amps of electric power was delivered to the vacuum tube. A significant amount of chromium and stron-

tium also appeared. Another dramatic result was the unexpected appearance of 1,500 ppm copper from the low energy transmutation of iron and lithium. In another test, 3,500 ppm germanium appeared from the transmutation of lithium and copper.

Iwamura: D_2 gas permeation through a nano-structured multilayer thin film composed of Pd and CaO thin film and Pd substrate with a target element induces nuclear transmutation reactions. These kind of transmutation reactions were firstly observed by my research team at Mitsubishi Heavy Industries and were successfully replicated by other institutes, such as Toyota R&D Center. Typical target element is Cs and produced element is Pr. Transmutation reactions of Ba into Sm and W into Pt were also observed by this method.

Li: Some of our significant results include: (1) Zn, Tb, in H/Pd (long-thin wire) gas loading system, presented at ICCF6, in collaboration with The Institute of Geology (The State Seismological Bureau) and The Institute of Geology (The Chinese Academy of Science); (2) $^{6}Li/^{7}Li$, in H/Pd (long-thin wire) gas loading system, presented at ICCF9. (Dr. Tom Passell made this detection in Silicon Valley possible.); (3) Cu, in D/Pd (thin film) gas-loading system, presented at ICCF13. (Dr. Bin Liu did this work as part of his dissertation research for the first Ph.D. earned in Condensed Matter Nuclear Science in China.)

Mizuno: What was most impressive was the precipitate that was found after cathodically electrolyzing Pd in heavy water and LiOD. The amount reaches several tens of grams. Particularly impressive was the fact that most of the elements were iron-based. The isotopic ratios of all these elements were different from nature.

Vysotskii: In my opinion, the most interesting (and important) results of our investigation of the transmutation process are related to prediction, observation, research and substantial optimization of transmutation of the most biologically dangerous reactor Cs-137 isotope to the stable Ba-138 isotope, which are very efficient in the presence of specialized biological substance (syntrophic microbiological association). The initial efficiency of such transmutation corresponded to a decrease in the decay time of Cs-137 from 30 years to a transmutation time by 50% in 250 days. At present, these parameters are very much improved. Now the efficiency of such transmutation reaction $^{137}Cs + p = {}^{138}Ba$ in the most optimized experiments with optimal biological substance is about 70% during 14 days. These experiments were preceded by studies of a similar transmutation reaction $^{133}Cs + p = {}^{134}Ba$ of the stable Cs-133 isotope to Ba-134. The technology of such transmutation is described in our patent ["Method for Purifying Water of Radionuclides," 2015, Int. Patent WO 2015156698 A1, PCT/RU2014/000273].

When you first found transmutation in an experiment, were the experiments aimed at transmutation or was it a byproduct of another process?

Biberian: All the experiments I have performed were directed into checking possible transmutations.

Esko: In our experiments we set out to prove the transmutation hypothesis. Transmutation wasn't a byproduct; it was what we were looking for.

Iwamura: I aimed for a transmutation reaction, whose product was a rare element. I chose Cs as a target element. I expected La or Pr would be produced if we put Cs on the multilayer thin film based on my transmutation experiences. I hoped that a rare element would be produced, because rare elements make it easy to discriminate contamination elements.

Li: Unexpected products. It was aimed at higher loading ratio D/Pd(H/Pd) with good reproducibility. However, we found nuclear transmutation when we were searching for helium, and we found excess heat as a "pumping effect" (1999 Asti Meeting and ICCF9).

Mizuno: At that time, we used a closed container covered with Teflon inside the stainless steel cell and used a platinum recombination catalyst at the upper part of the furnace to return the deuterium and oxygen gas to heavy water for a long time at high temperature at high pressure (100°C or higher, several tens of atmospheric pressure); I observed neutron emission. I did not expect any transmutation reaction either.

Vysotskii: Our (Vysotskii & Kornilova) first transmutation experiments were conducted in 1992-1993. Until this time, I was very much engaged in the problem of creating a gamma-ray laser (including on the basis of Mössbauer nuclei). The result of these studies was the first in the world (and apparently the only) monograph *Gamma Lasers* (Vysotskii & Kuzmin, 1989, Moscow Univ. Publishing House), followed by numerous articles.

At the same time, I was very much engaged in the theory of nuclear reactions at low energy and participated at the plenary cold fusion meeting (ICCF1) in Provo, Utah in 1991. I had my own model of these processes and I was looking for the possibility of testing it.

At the same time, I dealt with the problems of radiation biology and radioecology and knew how microcultures react to radiation.

According to my theoretical models, LENR processes can proceed only in dynamic systems with nonstationary nanopotential wells.

We realized that growing microcultures are almost an ideal target for such research.

We attracted experienced microbiologist Igor Samoilenko to our team and conducted such experiments. Since I and my colleague Alla Kornilova were very familiar with the specifics of Mössbauer spectroscopy, we suggested the experiment on the synthesis of the most important Mössbauer Fe-57 isotope. We have discussed in detail the features of such reactions and the optimal method for their detection.

The idea was obvious—the reaction should be with the participation of a light isotope (for example, hydrogen) and with the participation of manganese. On the other hand, since manganese has only a single isotope ^{55}Mn, we needed deuterium in the form of heavy water. The main problem was that microcultures grow very poorly in heavy water. But we successfully solved this problem and immediately imple-

mented this not simple experiment based on the $^{55}Mn + {}^{2}d = {}^{57}Fe$ reaction.

The advantage of this reaction is that its efficiency was verified by fundamentally different methods—standard mass spectroscopy and precision Mössbauer spectroscopy. This and similar processes were presented in our patent ["A Method of Producing Stable Isotopes Due to Nuclear Transmutation Type Low-temperature Nuclear Fusion of Elements in Microbiological Cultures," 1995, RU2052223C1].

What transmutation results (other than your own) seem the strongest?

Biberian: I believe that the best experiment showing transmutation is the one of Iwamura that shows the decrease of an element and an increase of another one.

Esko: Our work was inspired by the work of George Oshawa, which was in turn inspired by the discoveries of Louis Kervran. Michio Kushi, a student of Ohsawa's, achieved dramatic results in experiments conducted in Cambridge in the mid-1960s. It was Kushi's lectures on this topic that directly inspired our work. The 19th century transmutation experiments conducted by Sir Norman Lockyer, the discoverer of the element helium and founder of *Nature*, have also provided inspiration.

Iwamura: Pam Boss' transmutation of U to Am was impressive at ICCF21.

Li: Fritz Will, tritium; Melvin Miles, helium; George Miley, Tadahiko Mizuno, Tadayoshi Ohmori, four peaks in distribution of nuclear products (particularly, Cu and Zn are in the peak); Yasuhiro Iwamura, Cs → Pr, (multiple layers with deuterium flux).

Mizuno: The atomic transformation of iron from the carbon of Bockris early in the cold fusion study is impressive.

Vysotskii: I believe that the most convincing and reliable experiments on transmutation in ordinary (non-biological) systems were carried out under strictly controlled conditions during the 32 day examination of the Andrea Rossi cell in Lugano. The group of scientists (experts) from Sweden and Italy obtained very convincing data on the transmutation of lithium, nickel and other isotopes.

Do you think it is possible to transmute lead, uranium, thorium, etc.?

Biberian: I have shown that uranium can be transmuted. I believe that other heavy elements can also be transmuted.

Esko: Yes. In our book, *Corking the Nuclear Genie*, I outline experiments for the low energy transmutation of uranium-235 and plutonium-239. If my hypothesis can be proven, it could solve the problem of nuclear waste.

Iwamura: I guess that fission reactions would occur if we would apply our method to uranium and thorium. Presumably, lead would not be transmuted.

Li: Possibly, according to my Resonant Surface Capture Model (ICCF21). The incoming D or H might stay at the surface of the target nucleus in terms of resonance in the elastic scattering process. This creates a nuclear active environment (NAE) or zone (NAZ) which facilitates the second step of nuclear transition without forming highly excited compound nucleus; therefore, there would be no strong gamma or neutron radiation. This resonant surface capture model is valid for high Z or low Z targets. If the low energy resonance state for lead, uranium, thorium, etc. are confirmed, then it is possible to transmute them.

Mizuno: I think that lead is stable, but uranium and thorium are considered possible.

Vysotskii: Our monographs *Nuclear Fusion and Transmutation of Isotopes in Biological Systems* (2003, Mir) and *Nuclear Transmutation of Stable and Radioactive Isotopes in Biological Systems* (2010, Pentagon Press) describe in detail the background and possible types of such reactions with participation of biological substance. We know how to realize some of them, but we do not have the technical and financial possibility to work with such isotopes.

Such reactions (*e.g.*, $^{238}U + p$) are also possible in any special non-stationary non-biological systems. A typical example is the reaction which can occur in the center of the Earth under the influence of shock waves and other factors (for more detail, see my response in the next section).

Are there geological transmutations (apart from radioactivity)?

Biberian: I believe so. This is the detailed work of Louis Kervran.

Esko: A colleague from MIT has hinted to me that transmutations may be occurring deep inside the earth. Transmutation may explain the continual appearance of certain metals with other metals in common ores. It may also explain the relative abundance of iron in the earth's crust. Our experiments with converting carbon to iron may hold the key. When lightning strikes a tree, for example, a portion of the tree's carbon may be converted into iron. Lightning may also cause two atoms of oxygen in the atmosphere to fuse, forming an atom of sulfur. My own feeling is that transmutation occurs constantly throughout the universe within giant electrically charged plasma clouds. If proven, such transmutations occurring at the galactic and intergalactic level would cast serious doubt on the Big Bang.

Iwamura: Yes, I imagine that transmutation reactions occur in the core of our earth because the core is supposed to be composed of Fe, Ni and H. But it is hard to prove it.

Li: Yes. The abnormal tritium in volcanic lakes has been confirmed.

Mizuno: I think the possibility is extremely high.

Vysotskii: Yes, such processes are certainly possible. One such process can be realized in the case of the self-similar formation of a traveling-wave reactor in the center of the Earth,

which is formed due to the effective transformation of ^{238}U to ^{239}Pu. The estimated power of a hypothetical georeactor is about 1 - 10 TW with neutrino activity up to $\langle dN_{\tilde{\nu}} / dt \rangle \approx 10^{24}$ $\tilde{\nu}$/sec.

It may happen due to continuous sedimentation of heavy uranium nuclei in liquid magma with possible formation of an actinide shell on the surface of the Earth solid core.

Nuclear reactions in this reactor

$$^{238}U + p + \Delta E \rightarrow {}^{239}Np \xrightarrow{2.3d} {}^{239}Pu + B^-$$

may be stimulated by self-formation of coherent correlated states (CCS) of light particles (protons) for which transparency of nuclear potential barrier of interaction with nearest nuclei increases by many orders (up to 10^{100} and more times) of magnitude.

A physical reason for such effect is associated with the synchronization of the particle (*e.g.*, proton) momentum fluctuations in the multilevel superposition state in non-stationary nanowells, and formation of a very large kinetic energy fluctuation $\Delta E \geq 50$ - 100 KeV at a low average energy of the physical environment $\bar{E} \approx kT \approx 0.1$ - 0.3 eV. Such CCS may be formed during the fast growth or compression of microcracks in the presence of nonstationary shear strain in the Earth solid core, excitation of fast damped acoustic high frequency or low frequency vibrations, generation of shock waves, motion of slow particles in crystal surface, etc.

Similar reactions involving the same fluctuation-accelerated protons can occur also with the participation of other stable isotopes. These processes have been considered in many papers (*e.g.*, V.I. Vysotskii and M.V. Vysotskyy. 2013. "Coherent Correlated States and Low-Energy Nuclear Reactions in Non-Stationary Systems," *European Physics Journal A*, 49, 8, 1-12). In accordance with trends in the LENR community, such processes may be called "Nuclear Active Conditions" (NAC). In our opinion, such processes take place in all successful LENR experiments (both physical and biological).

In our opinion the self-similar process of CCS formation is the base of all transmutation reactions in growing biological systems. In the inanimate (dead) biological system, such reactions are impossible. We have tested these features many times in our experiments.

In the near future will it be possible to economically make noble metals by transmutation?

Biberian: I have serious doubts about making new noble metals economically, because the yield is very low. But you never know...

Esko: It has already been done. However, whether small tabletop experiments can be scaled into large industrial processes remains to be seen. In the palladium experiment, for example, two inexpensive elements—zinc and sulfur—are used to produce palladium, a much more expensive element. If the experiment can be scaled, it could be quite profitable.

Iwamura: It is a difficult question. Basically noble metals can be produced by abundant elements, however, the amount of the noble metals is not so large. I think economical feasibility depends on the prices of the noble metals.

Li: It depends on financial investments.

Mizuno: I believe it is possible.

Vysotskii: Yes, it is possible. In our books, models and some possible transmutation reactions with creation of gold and platinum are described:

$$^{190}Os + {}^{7}Li = {}^{197}Au,\ {}^{187}Re + {}^{7}Li = {}^{194}Pt,\ {}^{186}W + {}^{9}Be = {}^{195}Pt$$

It is also possible there are different reactions for such processes.

We have conducted some of these reactions with participation of microbiological substances and have observed creation of gold. These results are unpublished.

What benefits can society reap from the transmutation of elements, in particular?

Biberian: Biological transmutations are very important for health and agriculture. Other transmutations techniques can be important for nuclear waste destruction, but a lot more work needs to be done.

Esko: Transmutation of the elements is one side of the coin that will free humanity from the twin scourges of poverty and ignorance that have plagued it from the beginning. The other side is energy. Solving the mystery of the Great Pyramid, for example, may help greatly in that regard. For that we need to study the phenomenon of buoyancy, or as Edgar Cayce put it, "the way that iron swims" in water. We are surrounded by an ocean of air. It might be possible to apply the principle of buoyancy to floating heavy objects, like the giant blocks of the pyramid, in the air.

The principles of transmutation and unlimited energy are the principles of the universe. Understanding them will free humanity once and for all from the scourge of ignorance and poverty.

Iwamura: I think that the transmutation of radioactive elements is beneficial to society. Getting rid of radioactivity from the Fukushima area would contribute very much.

Li: It could solve the contamination problems in the nuclear industry. It would be a good energy source for space travel as well.

Mizuno: It is thought that it is possible to obtain great benefits such as making radioactivity harmless, producing rare elements, etc.

Vysotskii: The range of such benefits is very wide. These are the production of rare isotopes (similar to ^{57}Fe), energy production accompanying transmutation, the utilization of hazardous chemical compounds and spent nuclear fuel, the optimization of agricultural production, medical application and much more.

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