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A Method of Atomic Transformation, II: High-Yield Synthesis of Silver from Silicon

Peter Grandics*

Abstract — Previously, we published research showing that atomic transformation (transmutation) can be carried out under low-energy conditions akin to chemical catalysis. In this paper, we offer an example of synthesis of elemental silver from silicon, using liquid and solid state catalysis in a two-step process. We have found that the high ionic/electric activity of a concentrated sodium hydroxide solution in combination with heating is sufficient to induce atomic transformation and generate a product containing silicon dioxide with minor amounts of sodium and aluminum. When heated at a temperature of 1200°C, this mixture produces silver at a high yield. Results confirm ancient alchemists' claims of producing noble metals by syntheses utilizing simple, common chemical procedures.

Introduction

Historically, there have been intriguing accounts of alchemists generating noble metals using base metals like mercury or lead.¹ Such reports have come from all over the world. Famous alchemists ranked among the top intellectuals of their age,² including: Isaac Newton, Robert Boyle, Paracelsus, Tycho Brahe, Pope John XXII, Albertus Magnus and Robert Bacon. These practitioners emphasized utmost secrecy in their art to protect their “sacred work” from the uninitiated.

With the advent of the industrial era, alchemy disappeared from public discourse. Today, its accounts are largely considered fantasy and superstition, although it is generally acknowledged that alchemy led to the development of certain basic chemical procedures. While numerous attempts have been made to decipher alchemical texts, its formalism is completely alien to modern science, an example of which is the alchemical “equation” for the preparation of the Philosopher’s Stone (Figure 1).

This illustration shows a green lion (possibly an antimony

compound) “biting” the sun, the alchemical symbol of gold, with blood spurting from the wound. The mythic Philosopher’s Stone is described as a red substance derived from gold, a catalyst of transmutation and also a powerful health elixir. In the broadest sense, the purpose of alchemy was the extraction of life energy called “Od” from plants and minerals for healing and transmutation. This is similar to the Eastern philosophy’s concept of chi or prana.

We previously introduced a new theory of the atom that provides a theoretical framework for the design of low-energy nuclear reactions.^{3,4} This theory proposes that atoms exist as complex electromagnetic structures that are circulators of the space lattice, the carrier medium for electromagnetic interactions. We suggested that electromagnetic energy is pervasive throughout nature, and that electromagnetic

pressure of sufficient intensity should have the capacity to induce atomic transformation. In addition, the atom should be viewed as unity, regardless of whether chemical or nuclear reactions are involved. For this reason, we introduced the term low-energy atomic transformation to replace the term “nuclear reaction” in describing the synthesis of elements under conditions akin to chemical catalysis.

We hypothesized that sufficient electric pressure could be generated by utilizing high ionic activities of molecules, a method commonly used in chemical catalysis. We proposed that a single catalytic step may be enough to produce elements of lower atomic masses, while the synthesis of elements of higher atomic masses requires a second catalytic step. We have since proven this⁵ and now demonstrate how this method can be applied to synthesize the noble metal Ag.



Figure 1. Alchemical synthesis of the Philosopher's Stone.

Materials and Methods

All chemicals were obtained from Sigma-Aldrich, ACS grade

or equivalent. All containers coming into contact with reaction media were made of glass. The elemental transformation method used was described previously.⁵ Briefly, the reaction comprised two steps: first NaOH was refluxed gently for 24 hours in a borosilicate glass reactor. After cooling to room temperature, the pH was adjusted slowly to a slightly acidic level (pH 4-5) with 1:1 HCl. The solution became turbid and a white precipitate began to form early in the neutralization process.

From the slightly acidic pH, the mixture was re-adjusted to reach a mildly alkaline pH 8. As the supernatant slowly cleared, a white precipitate settled out. The precipitate was washed by re-suspension in deionized water and allowed to settle overnight followed by repeated washes with deionized water in a centrifuge. The objective was to remove residual salts, followed by air drying.

Subsequently, the precipitate was heated at 70°C for 7 hours to reach a constant weight. The granular, soft white material was crushed to a fine powder in a porcelain mortar and stored in a plastic jar at room temperature. The second catalytic step involved heating the white precipitate, mixed with high-purity carbon powder at various ratios, to 1200°C for 1-24 hours in a Sentrotech STT-1600 tube furnace. A graphite crucible was used for heating. The crucible was created by cutting 1" side-long cubes from a high-purity graphite sheet into which a 1 cm diameter hole was drilled to hold the precipitate. SEM-EDS analyses were performed using a Philips Quanta 600.

Results

We reported that heating of concentrated NaOH solution and subsequent neutralization led to the formation of a white precipitate⁵ that is represented by the chemical formula of $\text{Na}_{0.07}\text{Al}_{0.04}\text{SiO}_{2.27}$. It is predominantly SiO_2 with minor amounts of Na and Al along with a number of trace components.⁵

When heated at 1200°C in a high-purity graphite block, numerous electron-dense grains appear that were absent in the starting material (Figures 2 and 3). Subsequent EDS analysis of the grains (Figure 4) demonstrated Ag as the main reaction product, along with some U. No Ag or U was detected in the starting white precipitate or carbon products used by ESM-EDS (not shown).

The same sample area (Figure 3) was subjected to mapping: a 300x300 μm area was analyzed for Ag content, shown by white color (Figure 5). Besides the obvious large metal granules, the image is full of white dots of fine-grained Ag.

Discussion

Presently, elemental transformation (transmutation) is carried out in nuclear reactors and other systems utilizing nuclear radiation. Over the past two decades, a large body of evidence has accumulated on low-energy nuclear reactions demonstrating that electromagnetic effects can be sufficient to achieve atomic transformation.⁶⁻⁹ We previously introduced the

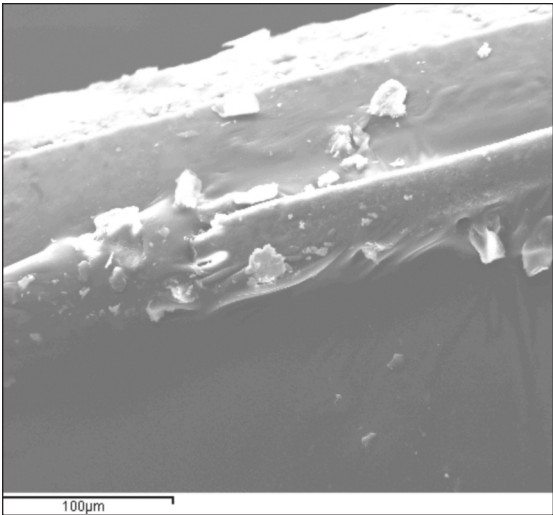


Figure 2. SEM image of sample area.

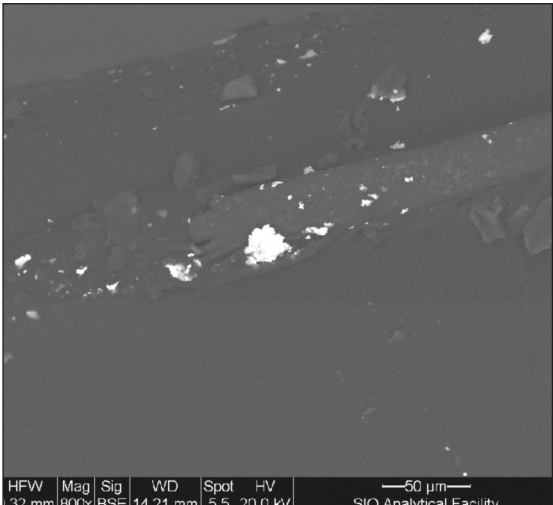


Figure 3. Backscatter image of sample area.

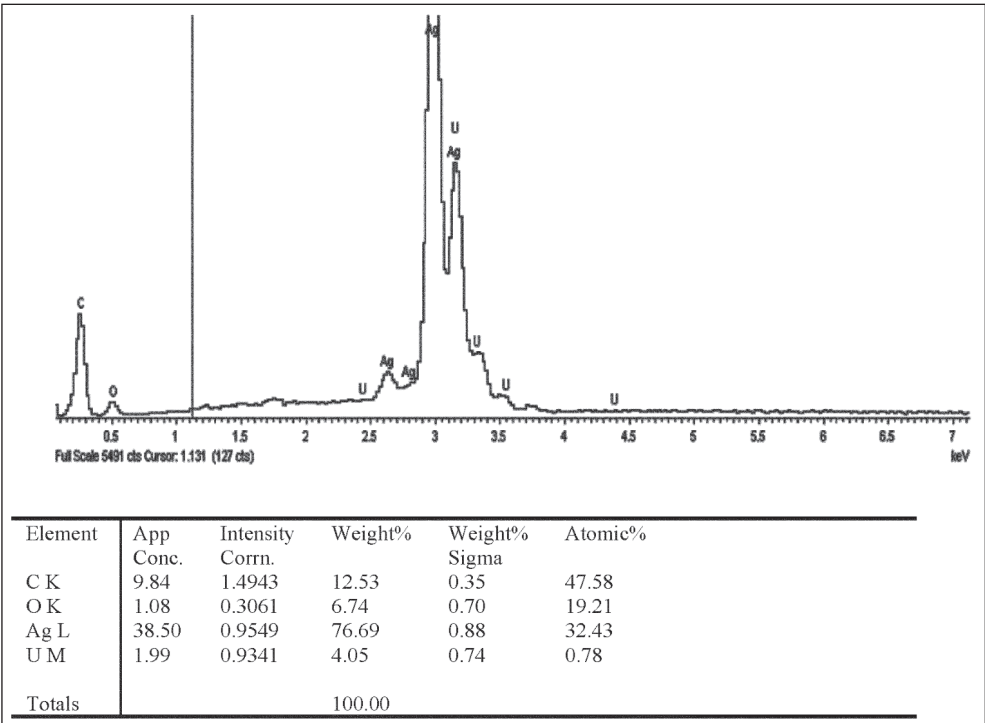


Figure 4. SEM-EDS analysis of the grains.

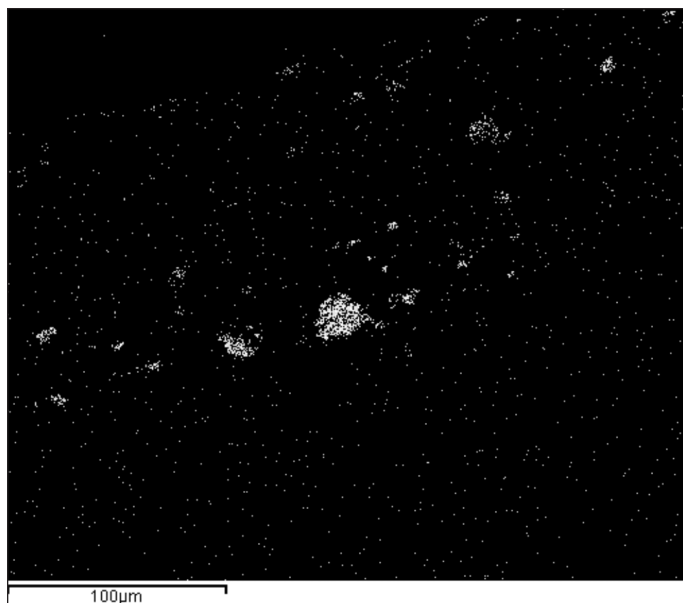


Figure 5. SEM-EDS area mapping for Ag.

term low-energy atomic transformation as opposed to nuclear reaction to describe the synthesis of new elements under conditions similar to chemical catalysis.⁵ As chemical reactions are electric, we reasoned that the high ionic/electric activity of extreme pH could be sufficient to drive atomic transformation reactions. Heating the reaction mixture amplifies the electric activity of high pH and should thus increase reaction rates.

In our atomic transformation reaction,⁵ we managed to transform Na into Mg, Al and Si at increasing concentrations in the very same order. Heating this reaction product at 1000°C yielded Ca, K, Fe, Ti, Mn, Cu, Zn, Zr, W, Ag, Au and Pd. Further optimization of reaction parameters led us to find conditions for the high-yield synthesis of Ag. The pairing of Ag with U is an interesting feature of this reaction as uranium-bearing silver deposits have been found in nature.¹⁰ A similar pairing of Au with Pd was observed in other reactions.⁵ Interestingly, palladium-bearing gold deposits have been discovered and reported.¹¹ We have reproduced here *in vitro* of naturally occurring elemental pairings. This is possibly due to some unknown physical (even harmonic) relationship between these pairs of metals.

The results indicate that normal geochemical conditions would be sufficient to produce many of the metals present in earth's crust, perhaps even all of them. Si is a major constituent of earth's crust; veins of quartz rock harbor noble metals including Ag and Au. We have here described reaction conditions to produce Ag from SiO₂ (quartz) at a high yield.

Regarding a possible mechanism of these reactions, we propose that the excitation of orbital electrons may lead to neutron decay, causing destabilization and subsequent rearrangement of atomic nuclei, forming new elements. In our reactions, excitation of sodium hydroxide leads to the formation of Si. Excitation of Si atoms produces a variety of heavier elements,⁵ including Ag and Au.

Our results herald a new era wherein humanity's dependence on natural resources will be a thing of the past. The time is approaching when we will be able to synthesize any

elements/metals in any quantity desired.

We have also shown that the mythical ancient art of alchemy has its roots in reality. While the alchemists' methods were remarkably simple by modern terms, their understanding of certain natural laws surpassed that of contemporary sciences. In summary, our work suggests that we may now be at the threshold of developing a new understanding of the atom and atomic processes, an understanding that could open an era of yet-to-be imagined opportunities for physical and material sciences.

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About the Author

Peter Grandics has an MS in chemical engineering and a Ph.D. in biochemical engineering. He has worked in the field of biomedical research.

*A-D Research Foundation
P.O. Box 130966
Carlsbad, CA 92013
Email: pgrandics@earthlink.net