# LETTER TO THE EDITOR

## ON AN EXPERIMENTAL CURIOSITY THAT IF UNDETECTED MAY LEAD TO ERRONEOUS FAR-REACHING CONCLUSIONS

Recently, a renewed interest has been observed among some colleagues of the possibilities of inducing nuclear effects by carrying out only chemical reactions.[1] Undoubtedly, this interest is a result of the still unresolved problem of "cold fusion," and some colleagues tend to see a clear connection, and even an extension of the studies, between cold fusion and the alleged chemical transmutation of elements. While we have already published thorough reports (negative so far) of our studies with regard to the claimed increase of gamma-ray emission and beta decay after burning of a mixture of chemicals,[2,3] in this letter, we wish to inform the *Fusion Technology* readership of an experimental curiosity that we encountered during similar studies that initially led us to an erroneous conclusion. We believe that sharing this information with those interested in the question is important so that errors of a similar character are avoided, which may avert the making of unsubstantiated far-reaching conclusions.

As in the previous studies,[2,3] we compared certain radiochemical properties of a mixture of chemicals before and after a chemical reaction (burning). Under discussion here is a peak that we observed in the range of 412 keV in the gamma spectrum of one of our burned samples after neutron activating it for 3 min at 1 kW. This peak was ostensibly not present in the same sample unburned. Because $^{198}_{79}$Au has a gamma peak at approximately this energy (411.8 keV), our attention and interest increased. This finding, if true, would have meant that the mercury, which the unburned sample contained, had "transmuted" into gold, which was not initially present in the unburned sample. This further would have meant that the highly unexpected "transmutations" of this sort, claimed by others,[1] would have been confirmed.

Determination of the true nature of this peak was somewhat accidental. In a subsequent burn, we again observed the peak at 411.7 keV immediately after neutron activation. Approximately 1 h after the neutron activation, we wanted to see the peak again, but when the sample was counted at this time with a germanium detector, the peak had completely disappeared. Because the aforementioned $^{198}_{79}$Au has a half-life ($t_{1/2}$) of 2.7 days (Ref. 4), the peak seen at ~412 keV could not have been due to the presence of this element. Another exotic possibility for the peak in the range of 411 keV, formation of $^{152}_{63}$Eu, was also excluded because its $t_{1/2}$ is 13.33 yr (Ref. 4) and its photopeak lies at 411.1-keV energy, which is somewhat lower than the energy we observed. It was speculated then that the observed peak at ~412 keV could be due to a single or a double escape peak of some other element. We noted from the data in Ref. 4 that $^{52}_{23}$V [$t_{1/2}$ = 3.75 min (Ref. 4)] has a photopeak at 1434.1 keV, which would provide a double escape peak fortuitously coinciding almost exactly with the peak of gold at 411.8 keV but having a much shorter half-life. Indeed, a photopeak of $^{52}_{23}$V was found in the gamma spectra after neutron activation of both burned and unburned samples. Figures 1 and 2 present parts of the gamma spectrum containing the photopeak and the second escape peak of $^{52}_{23}$V decaying in time.

To verify further the foregoing conclusion, we again neutron activated the samples before burning and determined that in the gamma spectrum taken immediately after irradiation, all three peaks (photopeak at 1434.1 keV, single escape peak at 923.1 keV, and double escape peak at 412.1 keV) due to vanadium were indeed present. Some 15 min after the irradiation, the peaks disappeared. In this way, our initial observation of the "unusual" event found its explanation. After the unburned sample had been neutron activated, obviously we inadvertently delayed the taking of its gamma spectrum, and the double escape peak had decayed; this led us to the erroneous conclusion that no peak in the range of 412 keV had ever existed in the unburned sample. Conversely, we accidentally took the gamma spectrum of the burned sample right after its neutron activation; this did not give enough time for the peak at ~412 keV to decay. We noticed this peak, and erroneously concluded that the appearance of a peak at 412 keV, fortuitously coinciding almost exactly with the value of the $^{198}_{79}$Au peak, was due to burning of the sample.

We encourage all our colleagues who have done neutron activation of such samples and claim to have seen similar transmutations, but still claim their reality, to check again their gamma spectra and note whether their findings can have a trivial explanation similar to ours.

*Vesselin C. Noninski*
*Judith L. Ciottone*
*Paul J. White*

Fitchburg State College
Department of Chemistry
Fitchburg, Massachusetts 01420

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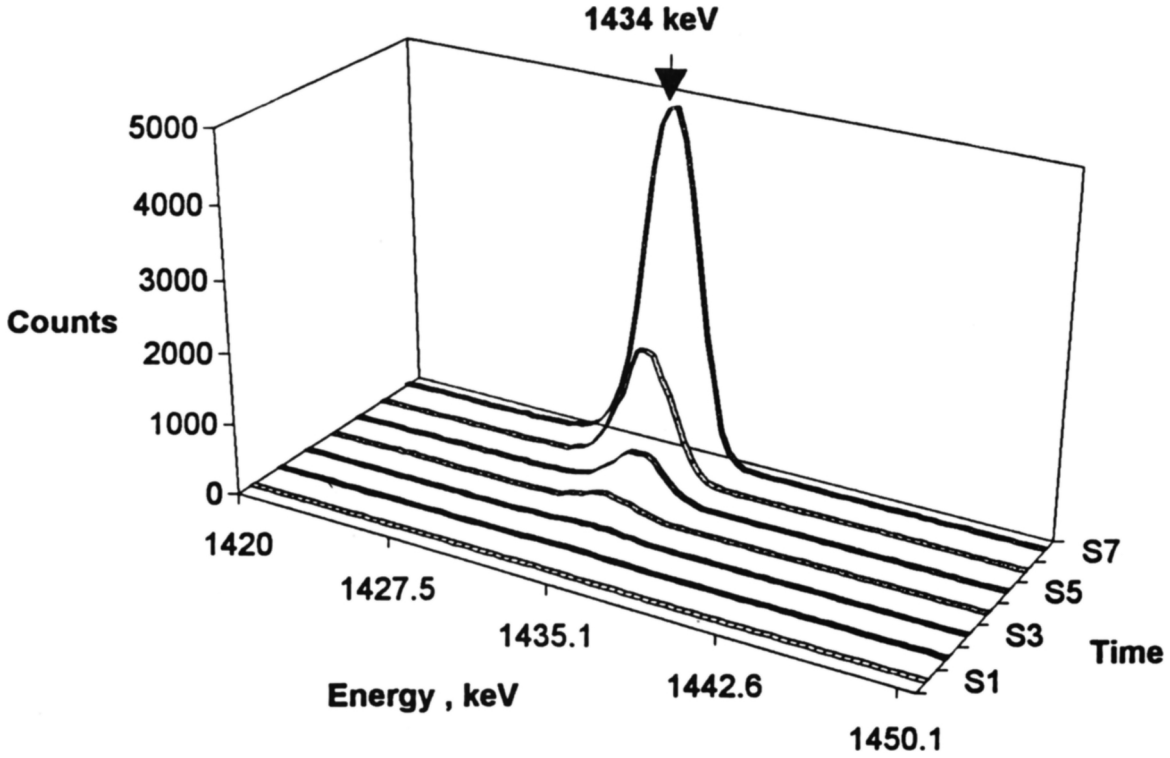


Fig. 1. Time variation of a part of the gamma spectrum of a neutron-activated burned sample containing the photopeak of $^{52}_{23}V$. The gamma spectrum was taken with a germanium detector, and the nuclear reactor power was 1 kW. The time of activation was 3 min. The S7 through S1 spectra were taken successively at 5-min intervals after the neutron activation.

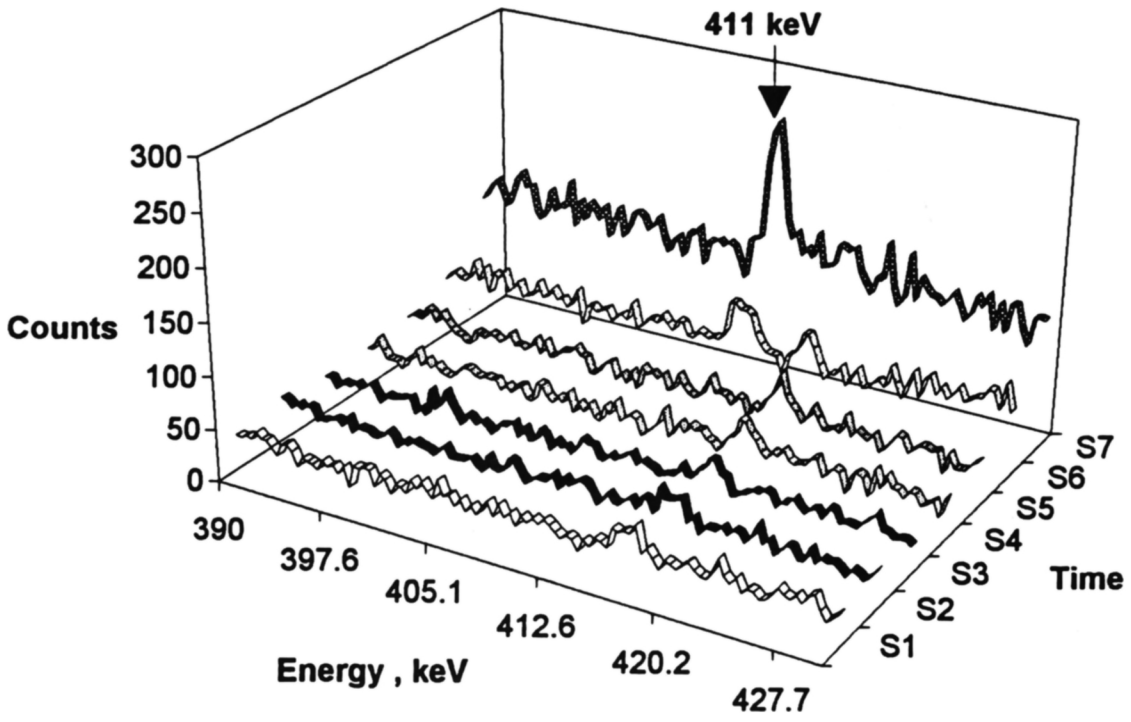


Fig. 2. Time variation of a part of the gamma spectrum of a neutron-activated burned sample containing the double escape peak of $^{52}_{23}V$. The conditions are the same as in Fig. 1.

## ACKNOWLEDGMENTS

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## REFERENCES

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