The Synthetic Routes to Element 136-138, 141, 146, 157 and 173

viXra:2210.????v1

Gang Chen†, Tianman Chen, Tianyi Chen

Guangzhou Huifu Research Institute Co., Ltd., Guangzhou, P. R. China

7-20-4, Greenwich Village, Wangjianglu 1, Chengdu, P. R. China

†Correspondence to: gang137.chen@connect.polyu.hk

Abstract

In our previous paper, we gave the synthetic routes to the 119-128th elements. In this paper, we give the synthetic routes to the 136-138th, 141th, 146th, 157th and 173th Elements. The 137th element could be called the Feynman end of the elements, and 173th element could be called the Dirac end of the elements, so the aim of this work is to explore the frontier of the elements.

Keywords: synthetic routes; element 136-138, 141, 146, 157 and 173; the frontier of the elements.

1. Introduction

R. Feynman deduced that the atomic number of the hydrogen-like atom couldn't be more than 137, otherwise the speed of the ground state electron in the atom would be bigger than the speed of the light in vacuum. So he supposed that the end of the elements would be the 137th element which is called Feymanium (Fy). On the other hand, by more detailed calculation with Dirac equation, the end of the elements should be the 173th element, which should be called the Dirac end of elements.

In our previous papers [1-14], we predicted the 119-173 elements which we called the ideal extended elements (*ie*), and in a recent paper [13] we designed the synthetic routes to the 119-128th elements. In this paper, we design the synthetic routes to the 136-138th, 141th, 146th, 157th and 173th elements. It is worthy to note that the numbers 137, 141, 157 and 173 correspond to the fine-structure constant, the square root of 2, $\pi/2$ and the square root of 3 respectively especially in the world of nuclides or the sub-atomic world, and there is formula "141/2 +173/2 = 157" or the three

numbers 141, 157 and 173 are in arithmetic progression. The number146 is also special because the most stable isotope of Uranium with 146 neutrons in its atomic nucleus and it is predicted by us that the 146th ideal extended element should have 224 neutrons. 136 and 138 could be called brother numbers of 137, or all of them could be called the numbers of the fine-structure constant, because as even numbers 136 and 138 are usually more stable numbers than 137 in nuclides but have the same effect as 137.

2. The Synthetic Routes to Element 136-138, 141, 146, 157 and 173

The Synthetic Routes to the 136th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{203}_{81}Tl_{122} \rightarrow {}^{344}_{137}Fy^{ie}_{207} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + \beta^{+}$$

$$^{141}_{56}Ba^{*}_{85} + {}^{207}_{82}Pb_{125} \rightarrow {}^{348}_{138}Fy^{ie}_{210} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + \alpha$$

$$^{238}_{92}U^{*}_{146} + {}^{106}_{46}Pd_{60} \rightarrow {}^{344}_{138}Fy^{ie}_{206} \rightarrow {}^{344}_{137}Fy^{ie}_{207} + \beta^{+} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + 2\beta^{+}$$

$$^{238}_{92}U^{*}_{146} + {}^{110}_{46}Pd_{64} \rightarrow {}^{348}_{138}Fy^{ie}_{210} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + \alpha$$

$$^{235}_{92}U^{*}_{143} + {}^{109}_{47}Ag_{62} \rightarrow {}^{344}_{139}Ch^{ie}_{205} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + 3\beta^{+}$$

$$^{235}_{92}U^{*}_{143} + {}^{113}_{48}Cd_{65} \rightarrow {}^{348}_{140}Ch^{ie}_{208} \rightarrow {}^{344}_{138}Fy^{ie}_{206} + \alpha \rightarrow {}^{344}_{136}Fy^{ie}_{208} + \alpha + 2\beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{112}_{48}Cd_{64} \rightarrow {}^{344}_{138}Fy^{ie}_{206} \rightarrow {}^{344}_{137}Fy^{ie}_{207} + \beta^{+} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + 2\beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{116}_{48}Cd_{68} \rightarrow {}^{348}_{138}Fy^{ie}_{210} \rightarrow {}^{344}_{136}Fy^{ie}_{208} + \alpha$$

The Synthetic Routes to the 137th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{205}_{81}Tl_{124} \rightarrow {}^{2\cdot173}_{137}Fy^{ie}_{209}$$

$$^{141}_{56}Ba^{*}_{85} + {}^{209}_{83}Bi^{*}_{126} \rightarrow {}^{350}_{139}Ch^{ie}_{211} \rightarrow {}^{346}_{137}Fy^{ie}_{209} + \alpha$$

$$^{238}_{92}U^{*}_{146} + {}^{108}_{46}Pd_{62} \rightarrow {}^{346}_{138}Fy^{ie}_{208} \rightarrow {}^{346}_{137}Fy^{ie}_{209} + \beta^{+}$$

$$^{238}_{92}U^{*}_{146} + {}^{112}_{48}Cd_{64} \rightarrow {}^{350}_{140}Ch^{ie}_{210} \rightarrow {}^{346}_{138}Fy^{ie}_{208} + \alpha \rightarrow {}^{346}_{137}Fy^{ie}_{209} + \alpha + \beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{114}_{48}Pd_{66} \rightarrow {}^{346}_{138}Fy^{ie}_{208} \rightarrow {}^{346}_{137}Fy^{ie}_{209} + \beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{118}_{50}Sn_{68} \rightarrow {}^{350}_{140}Ch^{ie}_{210} \rightarrow {}^{346}_{138}Fy^{ie}_{208} + \alpha \rightarrow {}^{346}_{137}Fy^{ie}_{209} + \alpha + \beta^{+}$$

The Synthetic Routes to the 138th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{207}_{82}Pb_{125} \rightarrow {}^{348}_{138}Fy^{ie}_{210}$$

$$^{238}_{92}U^{*}_{146} + {}^{110}_{46}Pd_{64} \rightarrow {}^{348}_{138}Fy^{ie}_{210}$$

$$^{238}_{92}U^{*}_{146} + {}^{114}_{48}Cd_{66} \rightarrow {}^{352}_{140}Ch^{ie}_{212} \rightarrow {}^{348}_{138}Fy^{ie}_{210} + \alpha$$

$$^{235}_{92}U^{*}_{143} + {}^{113}_{48}Cd_{65} \rightarrow {}^{348}_{140}Ch^{ie}_{208} \rightarrow {}^{348}_{139}Ch^{ie}_{209} + \beta^{+} \rightarrow {}^{348}_{138}Fy^{ie}_{210} + 2\beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{116}_{48}Cd_{68} \rightarrow {}^{348}_{138}Fy^{ie}_{210}$$

$$^{232}_{90}Th^{*}_{142} + {}^{120}_{50}Sn_{70} \rightarrow {}^{352}_{140}Ch^{ie}_{212} \rightarrow {}^{348}_{138}Fy^{ie}_{210} + \alpha$$

The Synthetic Routes to the 141th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{213}_{85}At^{*}_{158} \rightarrow {}^{354}_{141}Ch^{ie}_{213}$$

$$^{238}_{92}U^{*}_{146} + {}^{116}_{49}In^{*}_{67} \rightarrow {}^{354}_{141}Ch^{ie}_{213}$$

$$^{238}_{92}U^{*}_{146} + {}^{116}_{50}Sn_{66} \rightarrow {}^{354}_{142}Ch^{ie}_{212} \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \beta^{+}$$

$$^{238}_{92}U^{*}_{146} + {}^{120}_{52}Te_{68} \rightarrow {}^{358}_{144}Ch^{ie}_{214} \rightarrow {}^{354}_{142}Ch^{ie}_{212} + \alpha \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \alpha + \beta^{+}$$

$$^{235}_{92}U^{*}_{143} + {}^{119}_{50}Sn_{69} \rightarrow {}^{354}_{142}Ch^{ie}_{212} \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \beta^{+}$$

$$^{235}_{92}U^{*}_{143} + {}^{123}_{52}Te_{71} \rightarrow {}^{358}_{144}Ch^{ie}_{214} \rightarrow {}^{354}_{142}Ch^{ie}_{212} + \alpha \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \alpha + \beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{122}_{50}Sb_{72} \rightarrow {}^{354}_{140}Ch^{ie}_{214} \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \beta$$

$$^{232}_{90}Th^{*}_{142} + {}^{122}_{52}Te_{70} \rightarrow {}^{354}_{142}Ch^{ie}_{212} \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{126}_{52}Te_{74} \rightarrow {}^{358}_{142}Ch^{ie}_{216} \rightarrow {}^{354}_{140}Ch^{ie}_{214} + \alpha \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \alpha + \beta$$

$$^{232}_{90}Th^{*}_{142} + {}^{126}_{54}Xe_{72} \rightarrow {}^{358}_{144}Ch^{ie}_{214} \rightarrow {}^{354}_{142}Ch^{ie}_{212} + \alpha \rightarrow {}^{354}_{141}Ch^{ie}_{213} + \alpha + \beta^{+}$$

The Synthetic Routes to the 146th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{229}_{90}Th^{*}_{139} \rightarrow {}^{370}_{146}Ch^{ie}_{224}$$

$$^{141}_{56}Ba^{*}_{85} + {}^{233}_{92}U^{*}_{141} \rightarrow {}^{374}_{148}Ch^{ie}_{226} \rightarrow {}^{370}_{146}Ch^{ie}_{224} + \alpha$$

$$^{238}_{92}U^{*}_{146} + {}^{132}_{54}Xe_{78} \rightarrow {}^{370}_{146}Ch^{ie}_{224}$$

$$^{238}_{92}U^{*}_{146} + {}^{136}_{56}Ba_{80} \rightarrow {}^{374}_{148}Ch^{ie}_{226} \rightarrow {}^{370}_{146}Ch^{ie}_{224} + \alpha$$

$$^{235}_{92}U^{*}_{143} + {}^{135}_{56}Ba_{79} \rightarrow {}^{370}_{148}Ch^{ie}_{222} \rightarrow {}^{370}_{147}Ch^{ie}_{223} + \beta^{+} \rightarrow {}^{370}_{146}Ch^{ie}_{224} + 2\beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{138}_{56}Ba_{82} \rightarrow {}^{370}_{146}Ch^{ie}_{224}$$

$$^{232}_{90}Th^{*}_{142} + {}^{142}_{58}Te_{84} \rightarrow {}^{374}_{148}Ch^{ie}_{226} \rightarrow {}^{370}_{146}Ch^{ie}_{224} + \alpha$$

The Synthetic Routes to the 157th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{259}_{101}Md^{*}_{158} \rightarrow {}^{400}_{157}Ch^{ie}_{243}$$

$$^{141}_{56}Ba^{*}_{85} + {}^{263}_{103}Lr^{*}_{160} \rightarrow {}^{404}_{159}Ch^{ie}_{245} \rightarrow {}^{400}_{157}Ch^{ie}_{243} + \alpha$$

$$^{238}_{92}U^{*}_{146} + {}^{162}_{65}Tb^{*}_{97} \rightarrow {}^{400}_{157}Ch^{ie}_{243}$$

$$^{238}_{92}U^{*}_{146} + {}^{162}_{66}Dy_{96} \rightarrow {}^{400}_{158}Ch^{ie}_{242} \rightarrow {}^{400}_{157}Ch^{ie}_{243} + \beta^{+}$$

$$^{238}_{92}U^{*}_{146} + {}^{166}_{68}Er_{98} \rightarrow {}^{404}_{160}Ch^{ie}_{244} \rightarrow {}^{400}_{158}Ch^{ie}_{242} + \alpha \rightarrow {}^{400}_{157}Ch^{ie}_{243} + \alpha + \beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{168}_{68}Er_{100} \rightarrow {}^{400}_{158}Ch^{ie}_{242} \rightarrow {}^{400}_{157}Ch^{ie}_{243} + \beta^{+}$$

$$^{232}_{90}Th^{*}_{142} + {}^{172}_{70}Yb_{102} \rightarrow {}^{404}_{160}Ch^{ie}_{244} \rightarrow {}^{400}_{158}Ch^{ie}_{242} + \alpha \rightarrow {}^{400}_{157}Ch^{ie}_{243} + \alpha + \beta^{+}$$

The Synthetic Routes to the 173th Element:

$$^{141}_{56}Ba^{*}_{85} + {}^{294}_{117}Ts^{ie}_{177} \rightarrow {}^{435}_{173}Ch^{ie}_{262}$$

$$^{141}_{56}Ba^{*}_{85} + {}^{294}_{118}Og^{ie}_{176} \rightarrow [{}^{435}_{174}Ch^{ie}_{261}] \rightarrow {}^{435}_{173}Ch^{ie}_{262} + \beta^{+}$$

$$^{141}_{56}Ba^{*}_{85} + {}^{298}_{119}Ch^{ie}_{179} \rightarrow [{}^{439}_{175}Ch^{ie}_{264}] \rightarrow {}^{435}_{173}Ch^{ie}_{262} + \alpha$$

$$^{238}_{92}U^{*}_{146} + {}^{197}_{81}Tl^{*}_{116} \rightarrow {}^{435}_{173}Ch^{ie}_{262}$$

$$^{238}_{92}U^{*}_{146} + {}^{197}_{79}Au_{118} \rightarrow {}^{435}_{171}Ch^{ie}_{264} \rightarrow {}^{435}_{172}Ch^{ie}_{263} + \beta \rightarrow {}^{435}_{173}Ch^{ie}_{262} + 2\beta$$

$$^{235}_{92}U^{*}_{143} + {}^{200}_{80}Hg_{120} \rightarrow {}^{435}_{172}Ch^{ie}_{263} \rightarrow {}^{435}_{173}Ch^{ie}_{262} + \beta$$

$$^{235}_{92}U^{*}_{143} + {}^{204}_{82}Pb_{122} \rightarrow {}^{439}_{174}Ch^{ie}_{265} \rightarrow {}^{435}_{172}Ch^{ie}_{263} + \alpha \rightarrow {}^{435}_{173}Ch^{ie}_{262} + \alpha + \beta$$

$$^{232}_{90}Th^{*}_{142} + {}^{203}_{81}Tl_{122} \rightarrow {}^{435}_{171}Ch^{ie}_{264} \rightarrow {}^{435}_{172}Ch^{ie}_{263} + \beta \rightarrow {}^{435}_{173}Ch^{ie}_{262} + 2\beta$$

$$^{232}_{90}Th^{*}_{142} + {}^{207}_{82}Pb_{125} \rightarrow {}^{439}_{172}Ch^{ie}_{267} \rightarrow {}^{435}_{170}Ch^{ie}_{265} + \alpha \rightarrow {}^{435}_{173}Ch^{ie}_{262} + \alpha + 3\beta$$

The numbers in red color seems to correlate each other in some meanings.

3. Discussion and Conclusion

It should be very difficult or even impossible to synthesize these elements, but it should be important and meaningful to explore the frontier of the elements and establish suitable theories. The meanings for exploration of the frontier of the elements are comparable to those for explorations of the frontier and origin of the universe or the deepest nature of elementary particles. However, our theoretical explorations of the frontier of the elements are almost costless, but the explorations of the universe and elementary particles are extremely expensive.

References

1. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2002.0203.
2. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2008.0020.
3. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2010.0252.
4. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2012.0107.
5. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2101.0187.
6. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2102.0162.
7. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2103.0088.
8. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2104.0053.
9. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2106.0042.
10. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2106.0151.
11. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2108.0011.
12. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2108.0177.
13. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2208.0020.
14. G. Chen, T-M. Chen and T-Y. Chen, viXra e-prints, viXra:2208.0048.

Acknowledgements

Yichang Huifu Silicon Material Co., Ltd., Guangzhou Huifu Research Institute Co., Ltd. and Yichang Huifu Nanometer Material Co., Ltd. have been giving Dr. Gang Chen a part-time employment since Dec. 2018. Thank these companies for their financial support. Specially thank Dr. Yuelin Wang and other colleagues of these companies for their appreciation, support and help.

Appendix I: Research and Writing History

Section	Page	Writing Period	Location	Version
whole paper	1-5	2022/10/28-30	Chengdu	viXra:2210.????v1
Note: date was recorded according to Beijing Time.				