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The isotope program at ORNL for target for superheavy element research

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For more than 50 years, Oak Ridge National Laboratory's (ORNL) unique research facilities and staff have provided the research community with heavy actinides through fermium (^{257}Fm). These actinides have been used in the fabrication of targets for the discovery of nine superheavy elements, as identified in Table 1. The Radiochemical Engineering Development Center and the High Flux Isotope Reactor are truly one-of-a-kind facilities for the production and recovery of heavy actinides. All aspects of the reactor-produced heavy actinides will be addressed from fabrication of curium targets to the radiochemical separations and purification processing as depicted in Figure 1. Research activities for new production and separations techniques are being pursued at ORNL and will include novel irradiation schemes and radiochemical processing for berkelium and einsteinium production.

Table 1. Superheavy element discoveries enabled by ORNL-produced radioisotopes

Element	Year Produced	Target
104-Rutherfordium	1964	^{242}Pu, ^{249}Cf
105-Dubnium	1970	^{249}Bk, ^{249,250}Cf
106-Seaborgium	1974	^{249}Cf
113-Nihonium	2004	^{243}Am (decay from 115)
114-Flerovium	2000	^{244}Pu
115-Moscovium	2004	^{243}Am
116-Livermorium	2005	^{245,248}Cm
117-Tennessine	2010	^{249}Bk
118 - Oganesson	2006	^{249}Cf

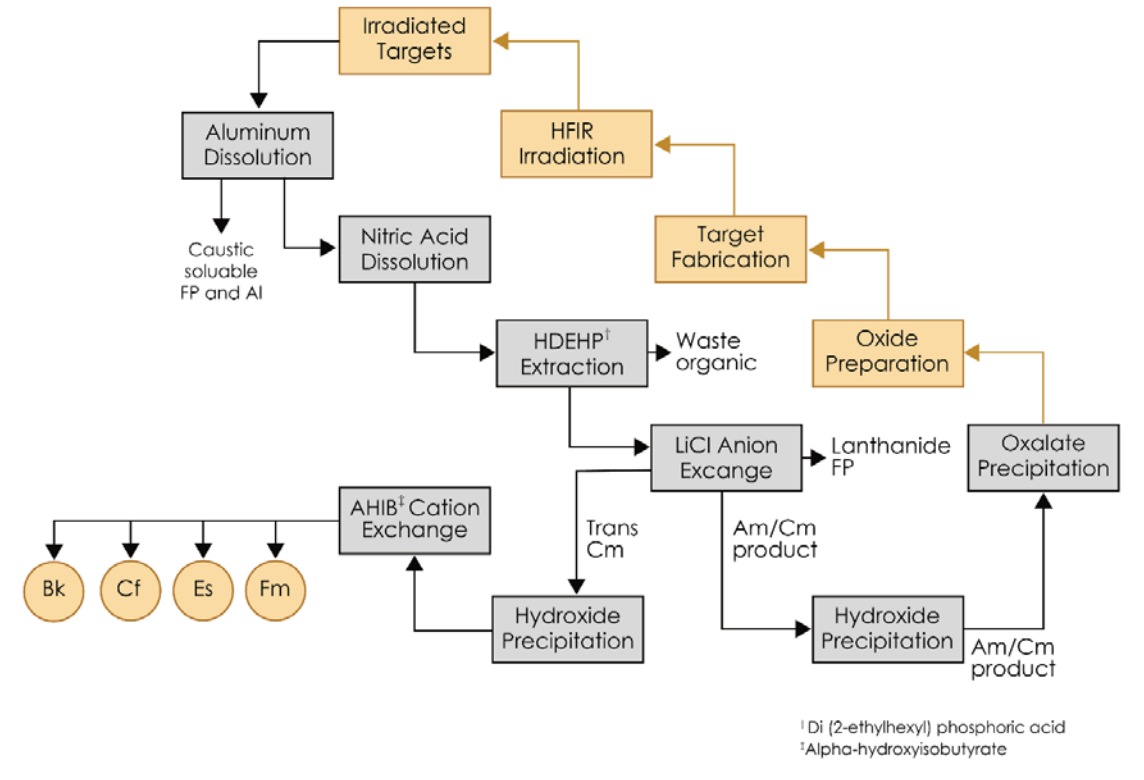

Figure 1. Radiochemical separations and purification of heavy actinides at ORNL.