

# International Conference on Management of Spent Fuel from Nuclear Power Reactors: An Integrated Approach to the Back End of the Fuel Cycle



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## Pyrohydrolysis research on the fluoride salts of TMSR

In order to make full use of the rich resources of thorium, a new nuclear reactor-TMSR (thorium molten salt reactor) was proposed. In this reactor, the molten mixture of ThF<sub>4</sub>, UF<sub>4</sub> and LiF-BeF<sub>2</sub> was used.

Now we are trying to develop a totally new flowsheet for TMSR spent fuel processing in which pyrohydrolytic technology is included. Pyrohydrolysis was first introduced by Warf et al. in the 1950s[1]. According to this method, the insoluble fluoride salts can be converted into corresponding oxides for further management.

The pyrohydrolysis behavior of different fluoride salts, such as ThF<sub>4</sub> and UF<sub>4</sub> were studied on our new designed equipment. The results showed that, UF<sub>4</sub> and ThF<sub>4</sub> were converted into their corresponding oxides UO<sub>2</sub>.25 and ThO<sub>2</sub> at 300 °C and 350 °C, and the conversion efficiency is over 99.0%[2].

[1] Warf, J.C., Cline, W.D., Tevebaugh, R.D. (1954) Pyrohydrolysis in determination of fluoride and other halides. *Anal. Chem.* 26(2): 342-346.

[2] Xiaoyu, D., Xiaobei, Z., Yulong, S., Yuxia, L., Lan, Z. (2014) Pyrohydrolysis of uranium tetrafluoride and thorium tetrafluoride. *J. Nucl. Radiochem.* 36(3):181-185.

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