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Accident Tolerant Fuel

Uranium Nitride fuel has great potential as fuel for advanced reactors due to its high thermal conductivity compared to that of Uranium Oxide fuel. The theoretical density of UN over UO₂ is roughly 40% higher which allows for tighter packing and faster heat transfer. The UN fuel also can be run at very high burnup which is a large advantage when it comes to self destruction of long-lived fission fragments or breeder reactor technologies.

The authors propose a few ways to protect the UN fuel from reacting with water, including creating several layers around the fuel with other composites. The UN based fuels showed a much longer cycle lifetime than UO₂ fuels, however the shielding of UN fuel determines the neutronic behavior of the system so these shielding components must be considered. It seems that the authors like to focus on water cooled reactors, but these fuels may have high viability in metal cooled reactors and would be interesting to see this study.