**PIE of thoria fuel irradiations carried out at BARC**

Comparison of Thoria & Urania based fuel behaviour

- Inherently stable
- Single valency
- Lower diffusivity
- Better thermal conductivity
- Higher FG retention

**ThO₂ fuel more tolerant for clad failure!**

**Comparison of performance of urania and thoria**

β-γ Autoradiograph

- Thoria 12,000 MWd/tU
- Urania 15,000 MWd/tU

![Graph showing relative counts for ThO₂ and UO₂ fuel pins]
A comparison of the microstructures of irradiated enriched UO$_2$
ThO$_2$+4% PuO$_2$, UO$_2$+4% PuO$_2$ and natural UO$_2$ fuels examined.

2.7% enriched UO$_2$ fuel irradiated to 11,000 MWd/t
LHR 35 kW/m
Fission gas release 13%
Fuel central temperature ~1300°C

ThO$_2$+4% PuO$_2$ fuel irradiated to 18,500 MWd/t
LHR 39.5 kW/m
Fission gas release 0.5%
Fuel central temperature <1200°C

UO$_2$+4% PuO$_2$ fuel irradiated to 16,000 MWd/t
LHR 41 kW/m
Fission gas release 0.5%
Fuel central temperature <1200°C

Natural UO$_2$ fuel of PHWR irradiated to 15,000 MWd/t
LHR 40 kW/m
Fission gas release 2%
Fuel central temperature ~1250°C

PRED, BARC