

# ORNL is fabricating W-Re-Os alloys to study transmutation in W exposed to neutron irradiation.

## W-Re-Os is needed by fusion material community

- Fusion neutron spectrum induces transmutation, converting pure W to W-Re-Os alloys in fusion reactors
- Knowledge gap exists in terms of plasma response, thermal and physical property alternation
- No available commercial W-Re-Os alloys

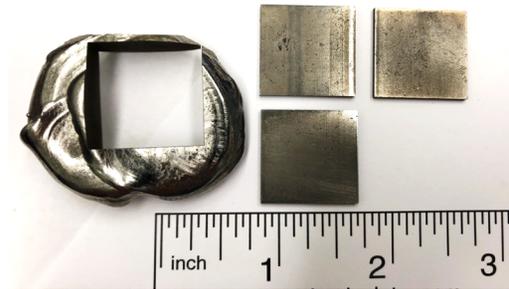
## Fabrication of W-Re-Os alloys at ORNL

- Arc melting technique; Mixing W, W-Re, and W-Os alloys
- W-10Re-5Os, W-5Re-3Os, and W-3Re-0.7Os (wt%) have been fabricated.
- Additional work is needed to confirm the chemical analysis results of the two new alloys

## Use of W-Re-Os alloys

- Quantifying transmutant elements in neutron-irradiated W was performed by using W-5Re-3Os for the first time.
- To be shared with the community for various purposes

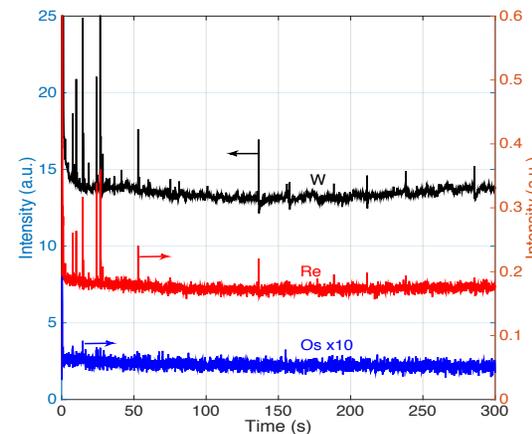
ORNL Team: X. Hu, Y. Katoh



As-fabricated W-5Re-3Os ingot and specimens prepared by using EDM



ORNL Glow Discharge-Optical Emission Spectroscopy



GD-OES elemental profile of W-3%Re irradiated at 1000°C to 0.47 dpa in HFIR

Comparison of modeling prediction and GD-OES measurements

Sample	Material	Irra. T. (°C)	dpa	PISPACT Calculation			GD-OES (W-5Re-3Os standard)		
				W (%)	Re(%)	Os(%)	W(%)	Re(%)	Os(%)
SX54	W	800	0.42	94.5	4.8	0.7	94.8	3.3	1.9
SX52	W	1000	0.47	94.0	5.2	0.8	95.6	3.1	1.3
R351	W-3Re	800	0.42	91.8	6.7	1.5	91.4	5.6	3.0
R354	W-3Re	1000	0.47	91.3	7.0	1.7	91.2	6.0	2.8