SP B.5 Characterize surface erosion of W and W+O model systems induced by hypervelocity W dust impacts.

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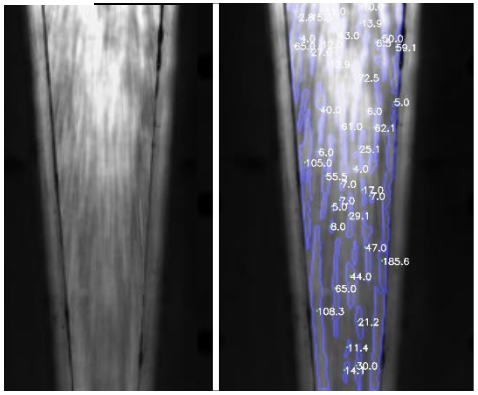
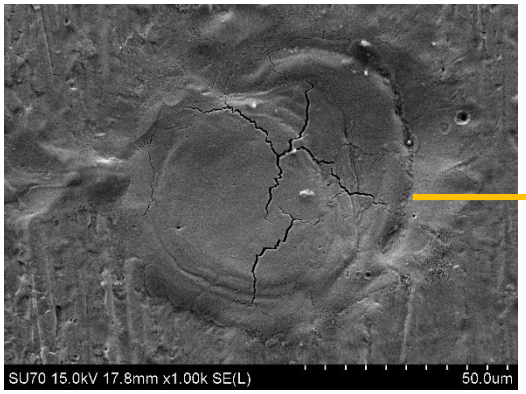
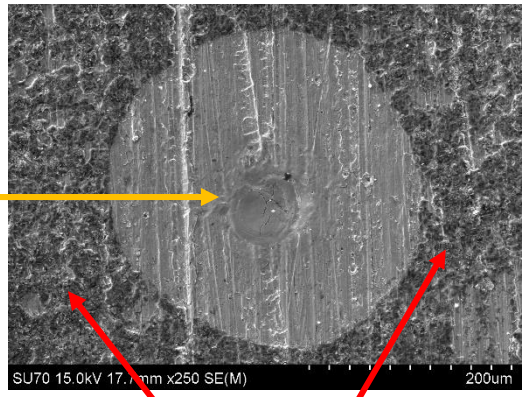
Background

- Craters, on FTU tiles, suggest the presence of dust impact at v_i ~800m/s [1];
- Video camera showed evidence of dust travelling, at least, at 540 m/s (FTU & Compass [2]) during explosion-like events due to REs striking on PFCs.



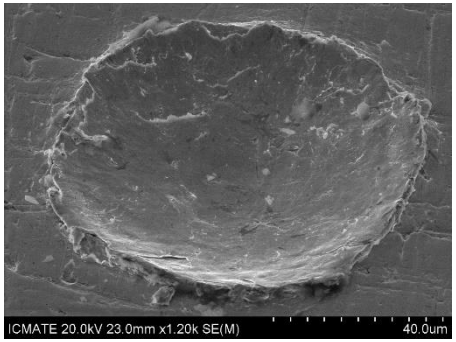




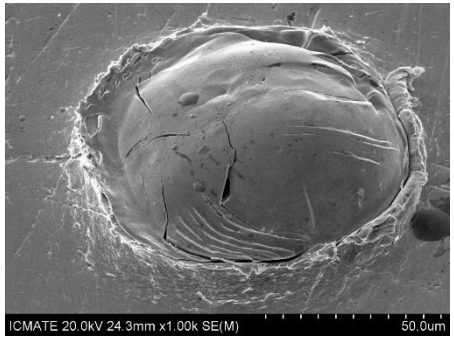
Mo-O codeposit 5-8µm

[1] M. De Angeli, P. Tolias, et al, Nucl. Fusion 63 (2023) 014001. [2] Private communication.

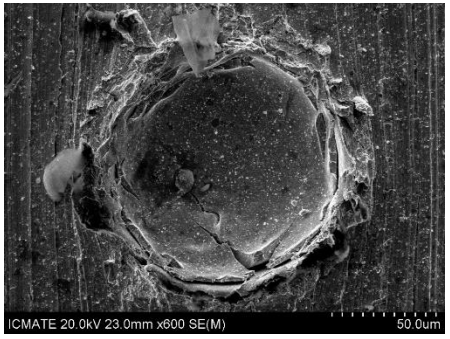
- Identified three regimes of W dust on W target impacts at different impact velocities:



Deformation regime, 200 ÷ 600 m/s → shallow crater formation.



Bonding or cold spray regime, 600 ÷ 1000 m/s → sticking of dust on target.



Partial disintegration regime, 1÷4 km/s → material splash ejection and partial fragmentation.

Proposed approach

Characterize co-deposit erosion of W and W+O model systems in the three impact regimes with fix W dust size (~70μm, the estimated grain size found for FTU tiles) by means of a light gas dust gun.

Analyses mainly carried out by means of SEM & microbalance.

Required samples:

- n. 6 W model system samples, two samples per v_i regimes (+1 spare);
- n. 6 W+O model system samples, two samples per v_i regimes (+1 spare);

After the first round of investigation, it will be evaluated if any additional investigation, around the most interesting v_i regime, is advisable.

NOTES:

- We can allocated samples up to 23x23mm;
- What is the realistic thickness of co-deposits expected ?