



Wir schaffen Wissen – heute für morgen



Laboratory for
Nuclear Materials

Nuclear Energy
and Safety

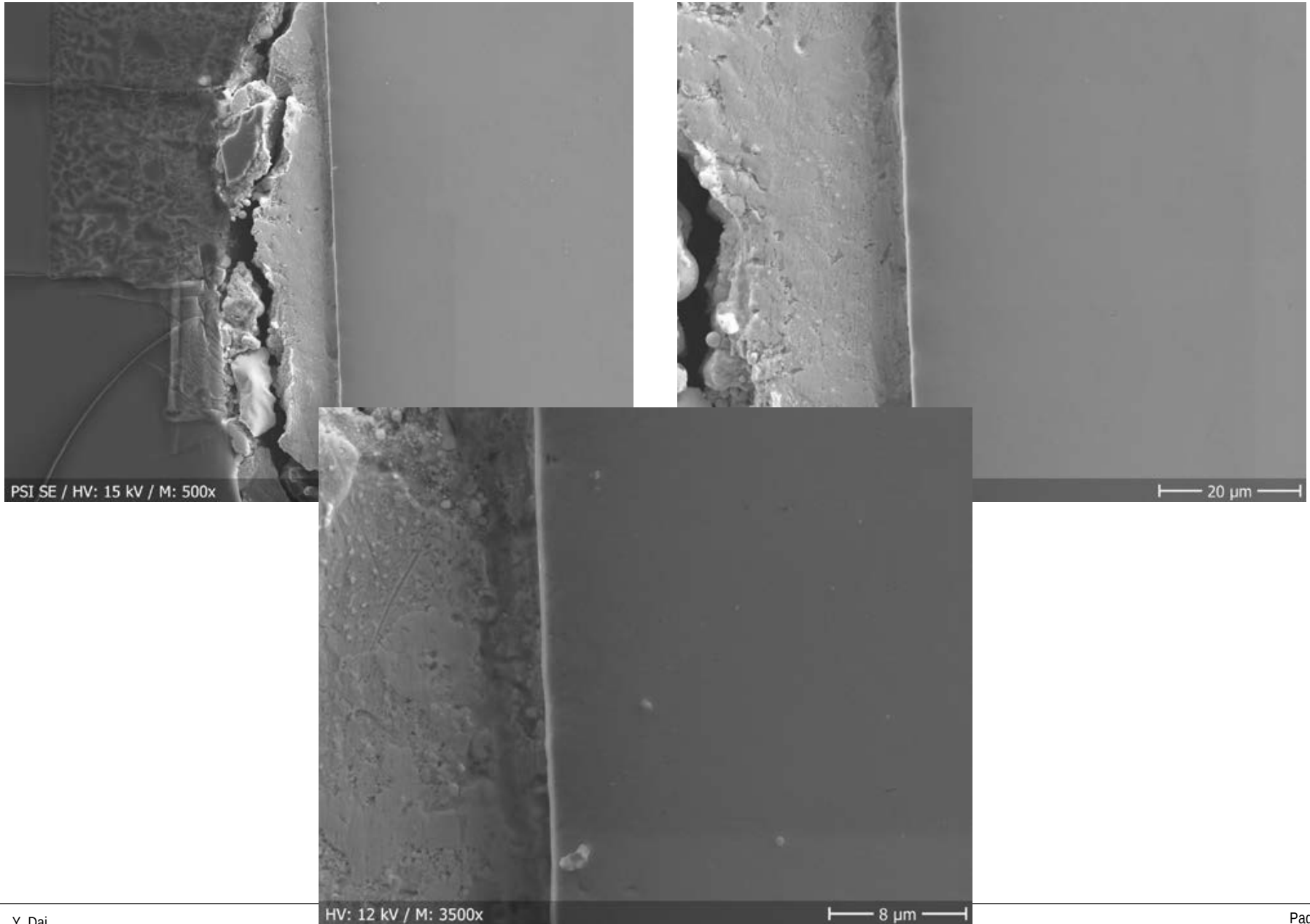
MEGAPIE PIE at PSI

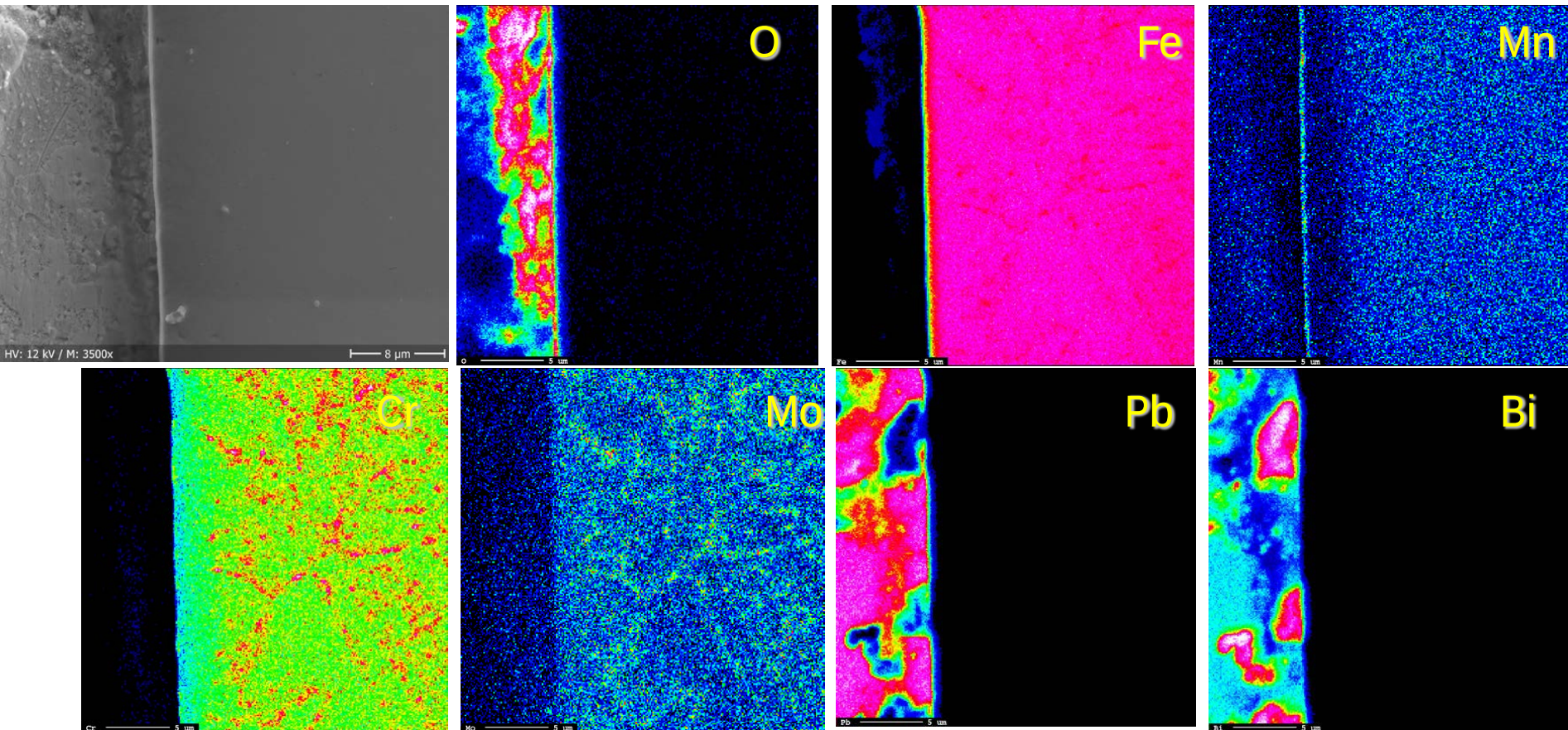
Yong Dai

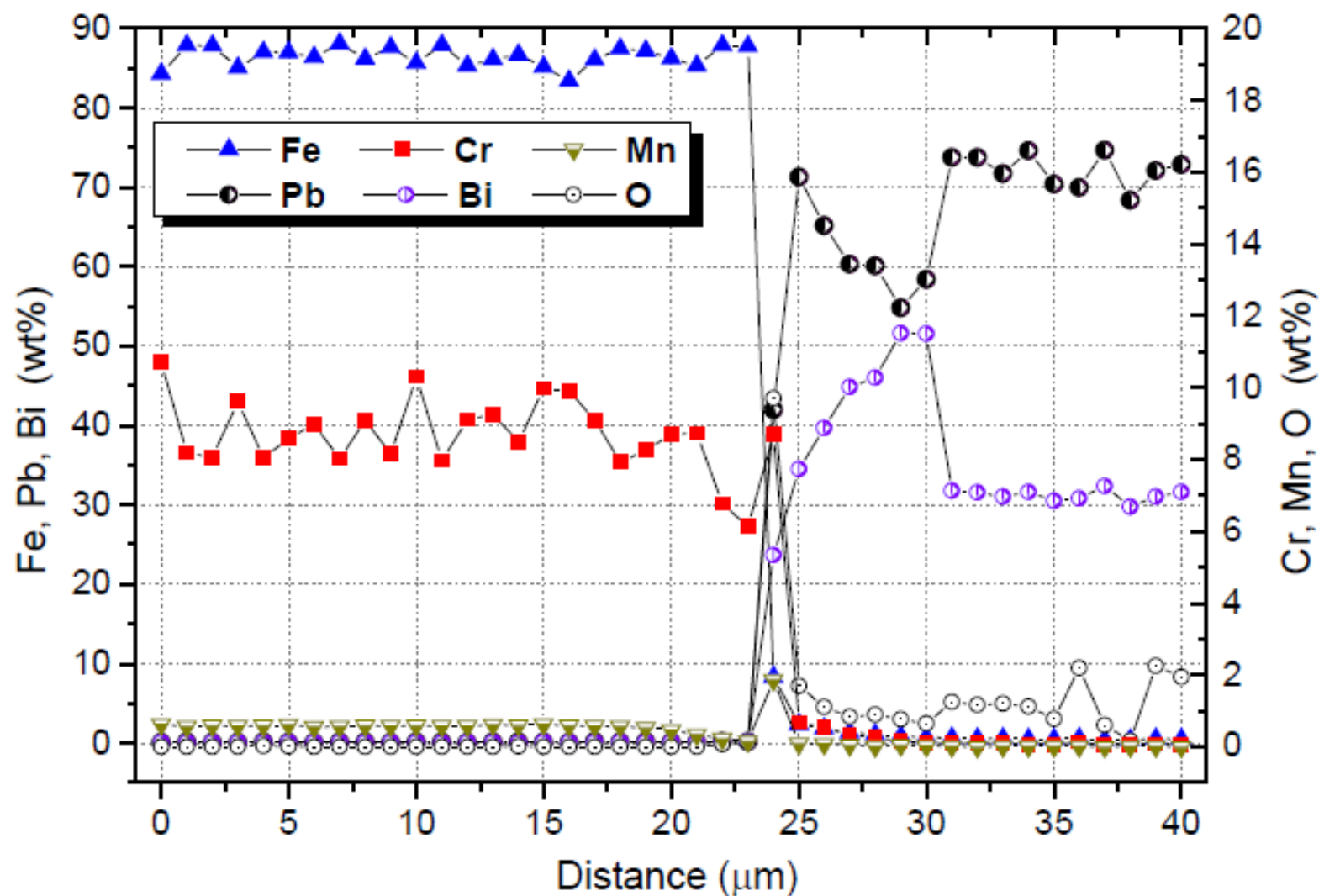
Main contributors:

Y. Dai, M. Wohlmuther, V. Boutellier, R. Brun, R. Grabherr,
B. Hammer, H. Leu, H.P. Linder, M. Martin, J. Neuhausen, S.
Portier, R. Restani, N. Shcherbina, D. Schumann, A. Spahr,
T. Zhang, R. Zubler

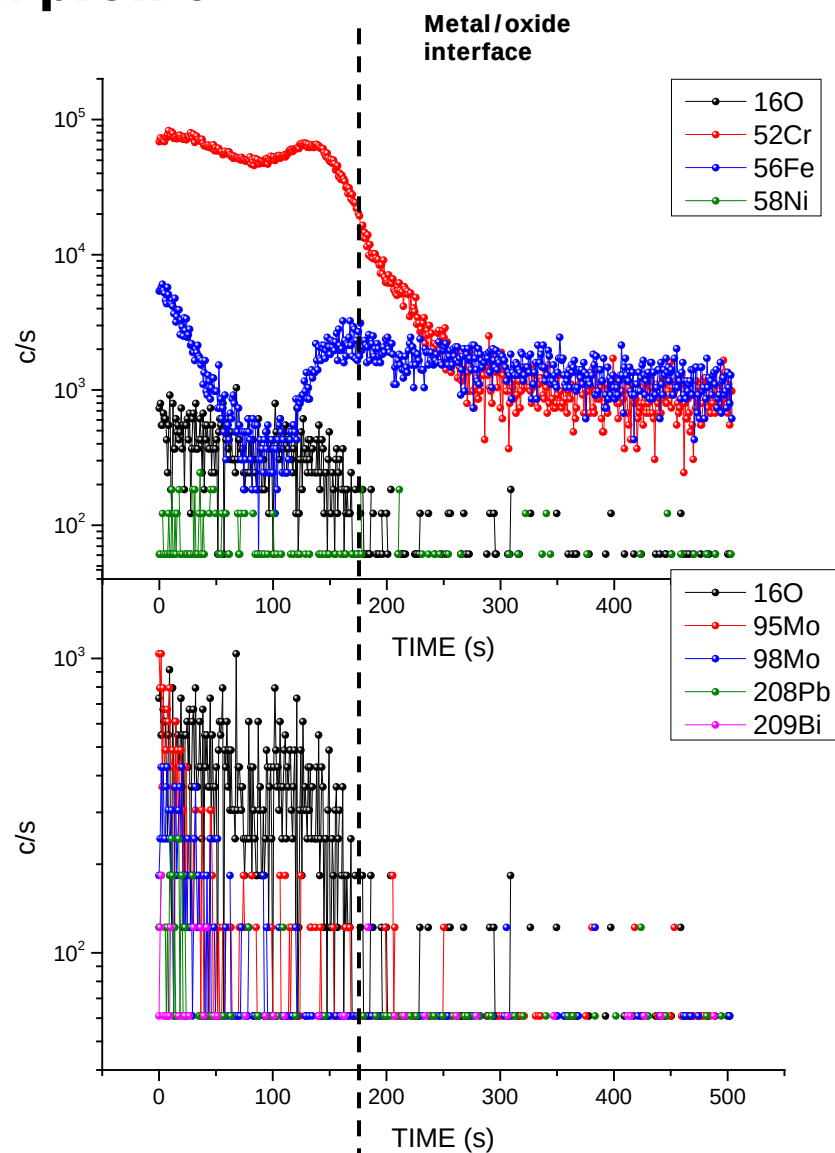
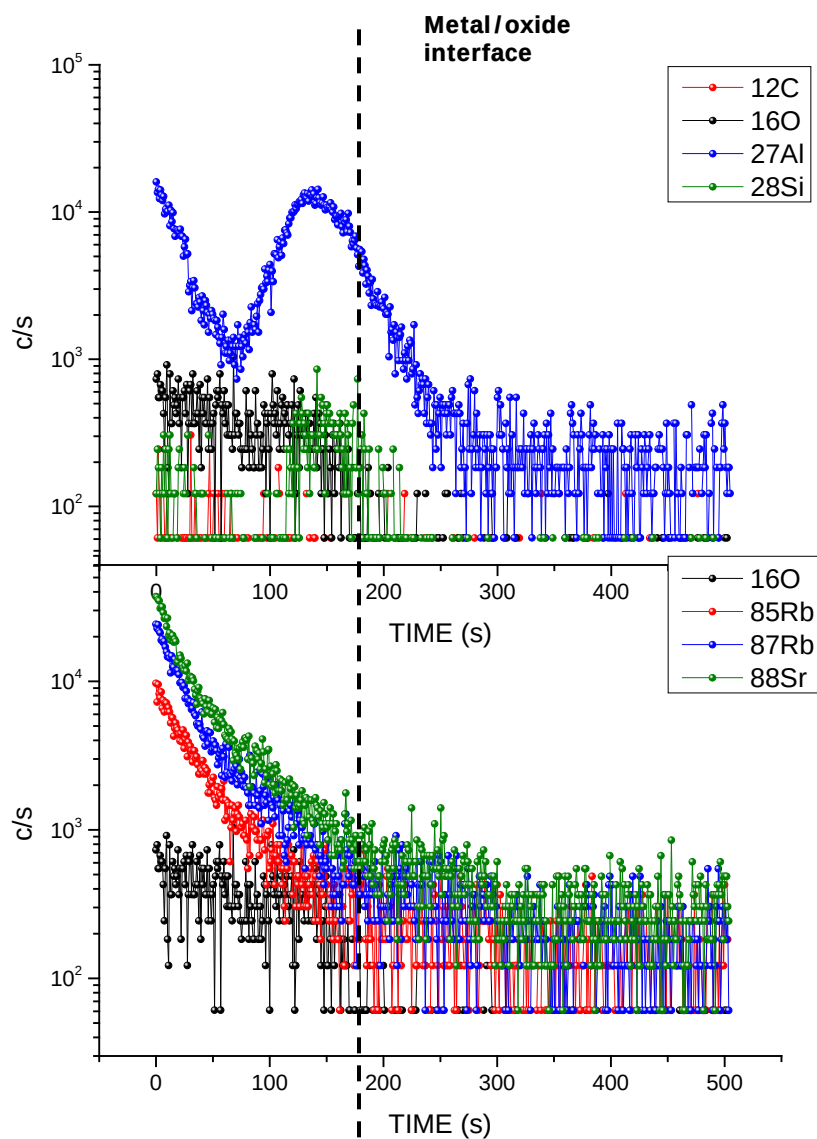
- **Non-destructive test (NDT)**
 - Gamma mapping of the Al-calotte
 - Visual inspection of the T91 calotte
 - Thickness measurement of the T91 calotte
- **Analysis of LBE samples**
- **Surface analyses**
 - EPMA analysis
 - SEM observation
 - SIMS analysis
- **Microstructural analyses**
 - TEM observation
- **Mechanical test**
 - Tensile test
 - Bend test
 - Hardness measurement
- **Summary**

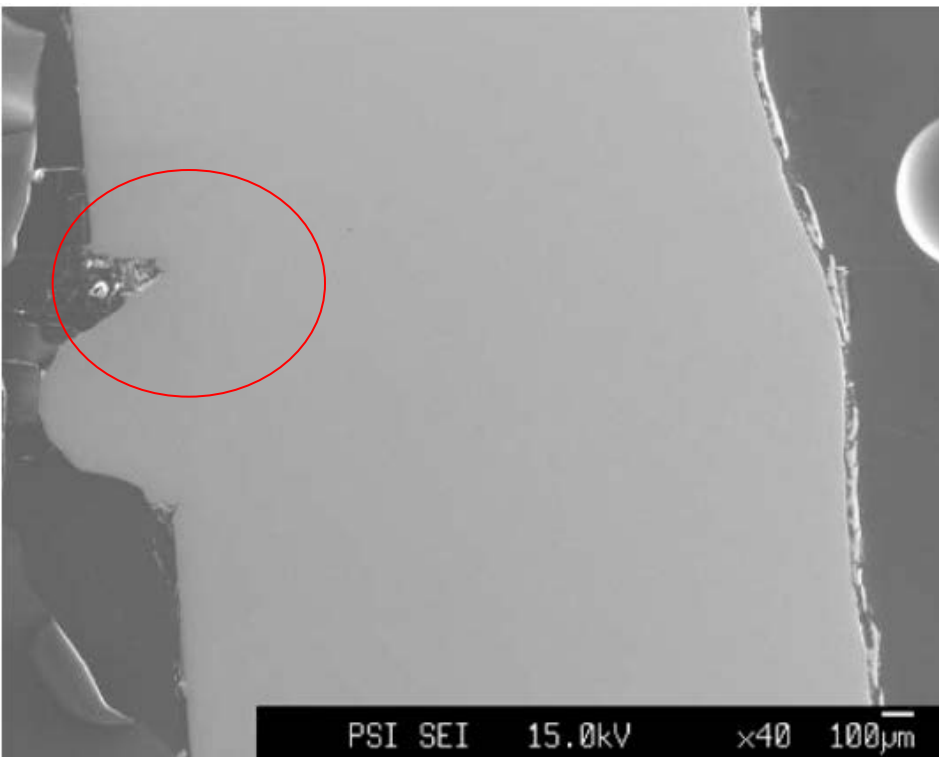
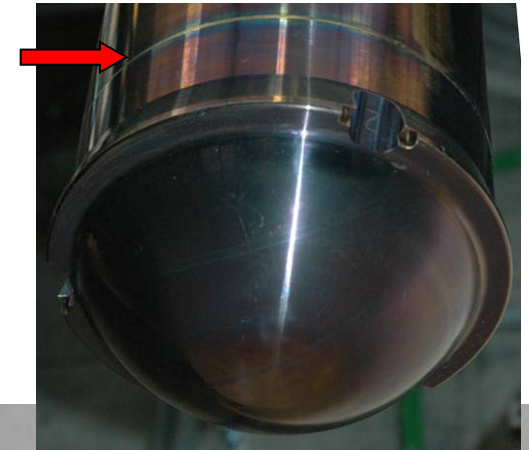




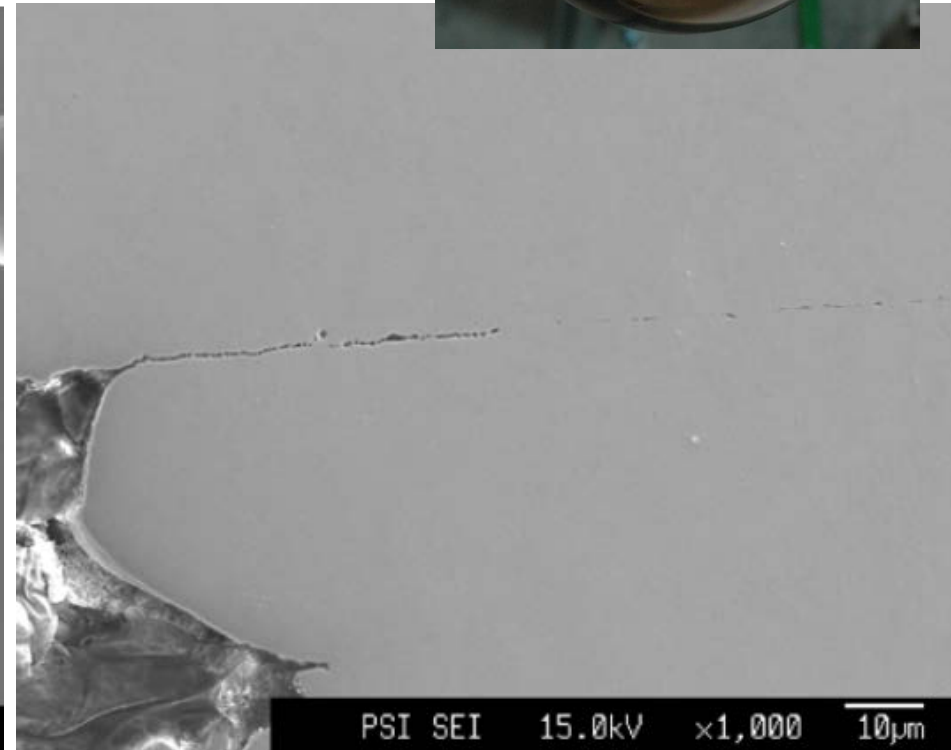


Depth profile

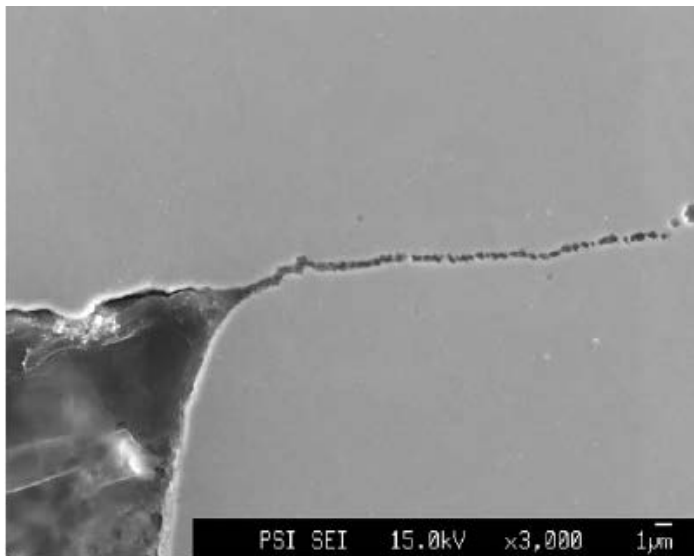




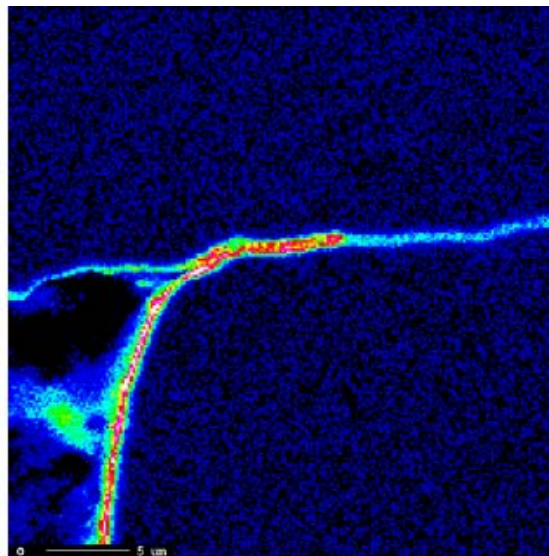
P2, Weld position (inside is on the left)



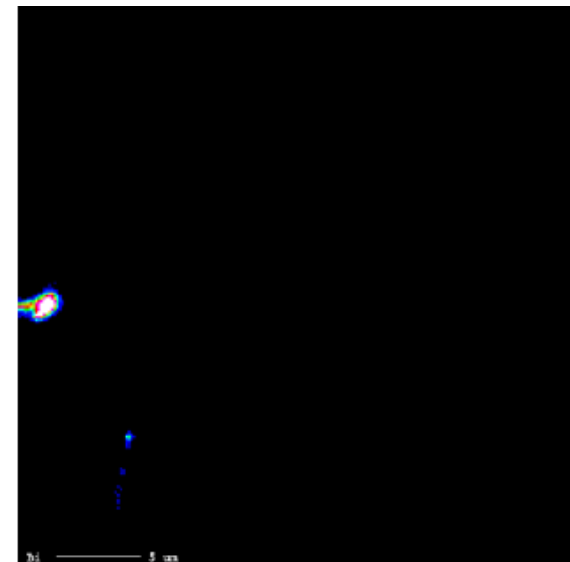
P2, section of left SEM (note: microcrack)



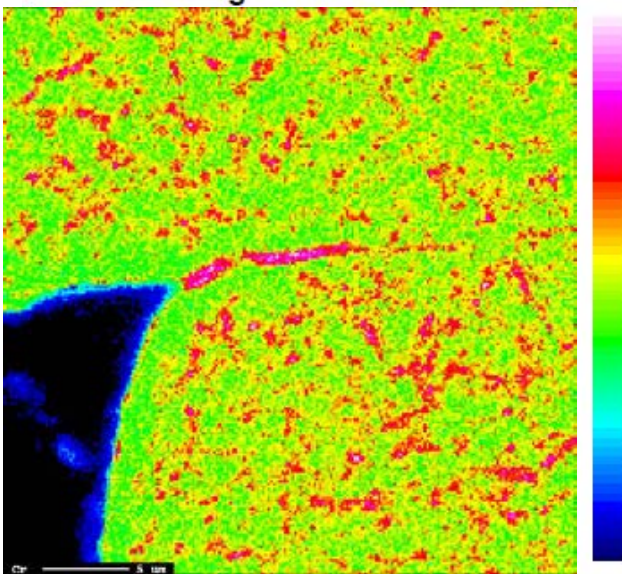
P2 : SEM-image



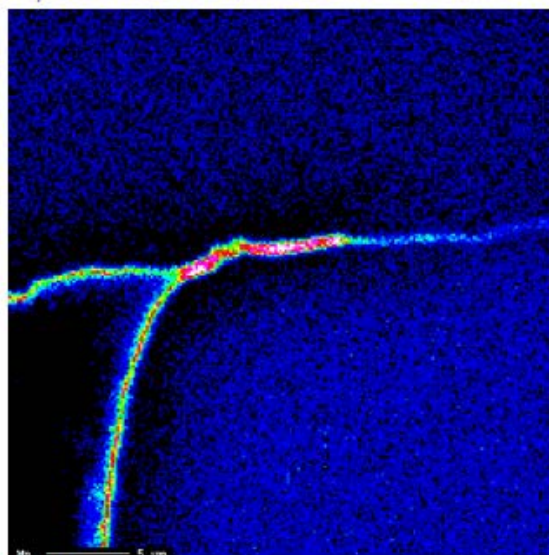
O, oxidation in crack



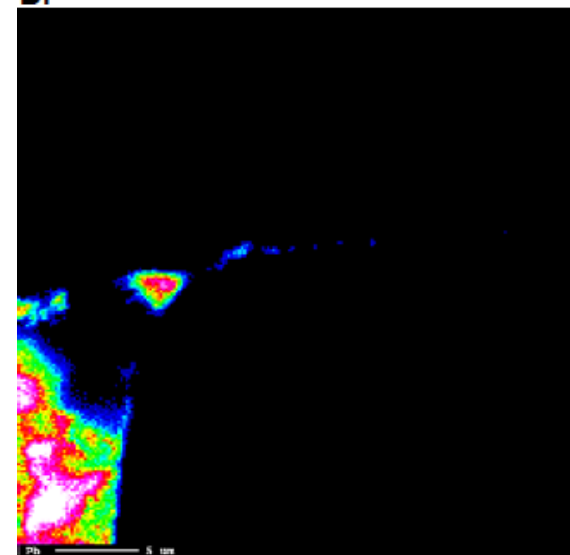
Bi



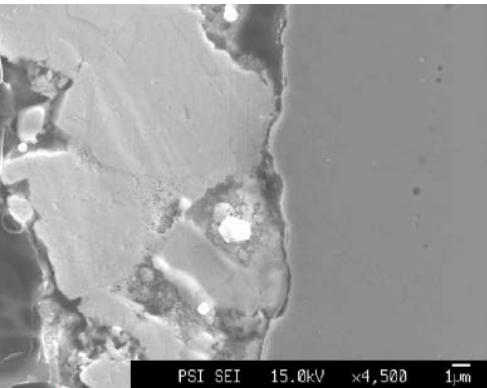
Cr



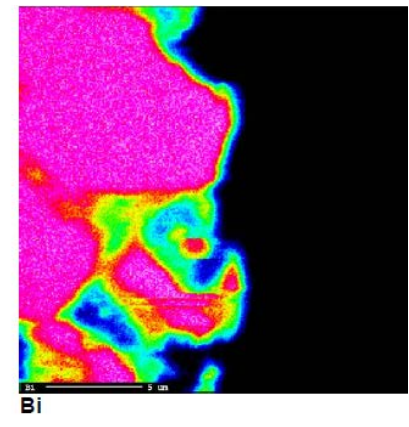
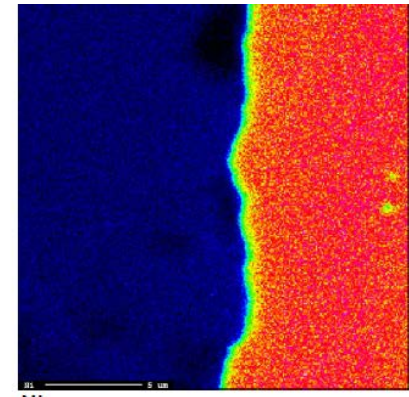
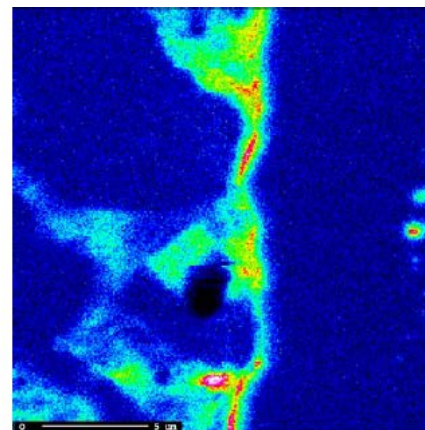
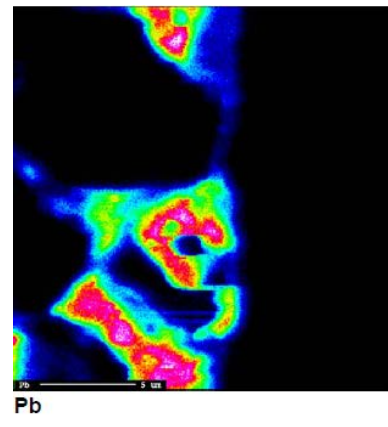
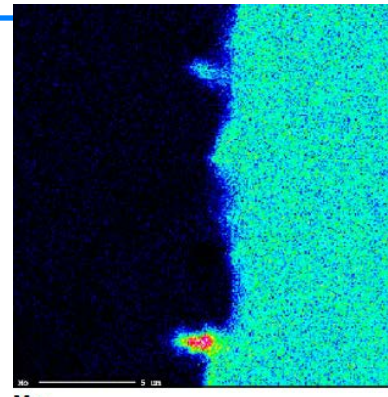
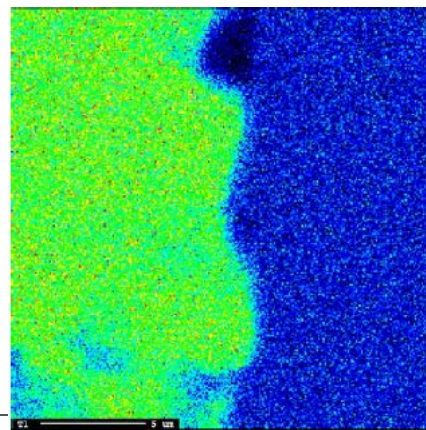
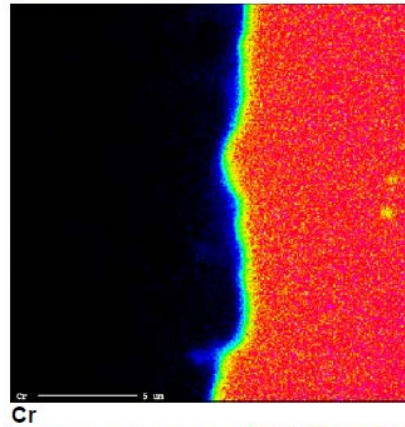
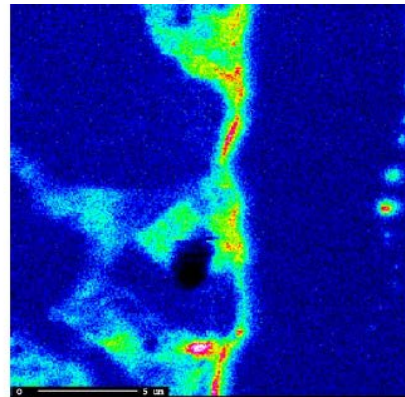
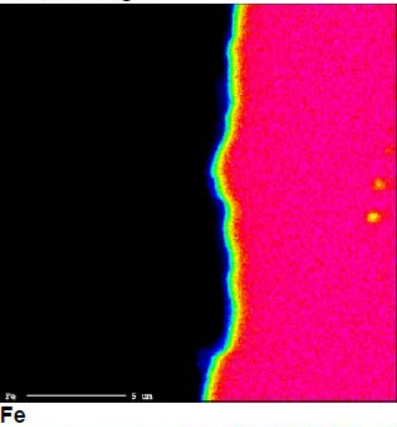
Mn(Cr)

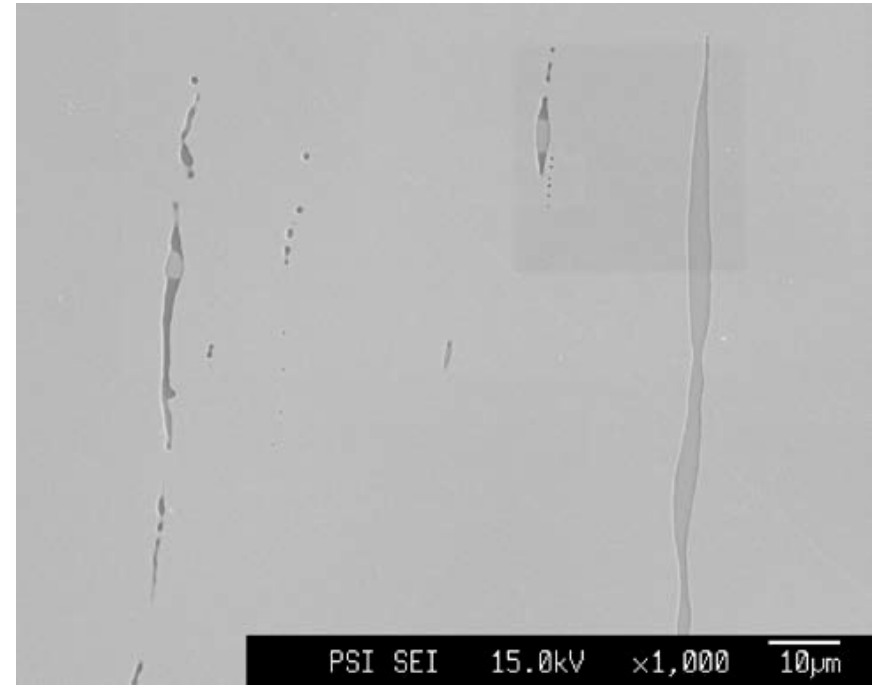
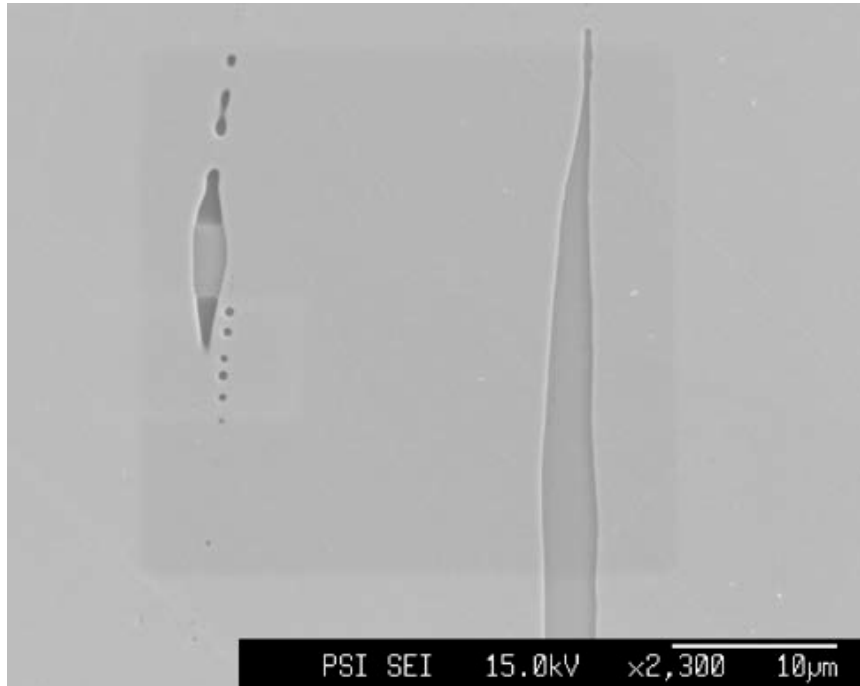


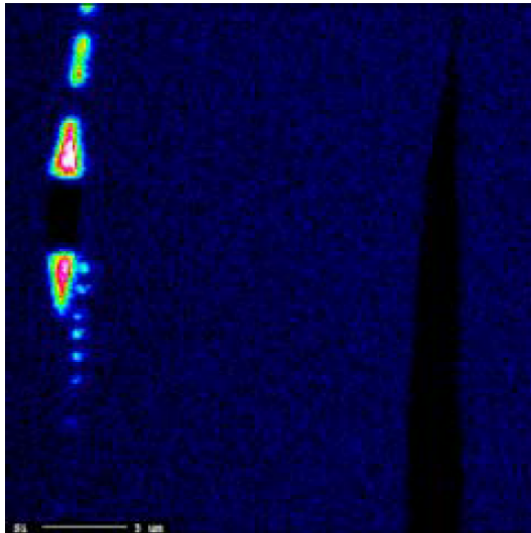
Pb



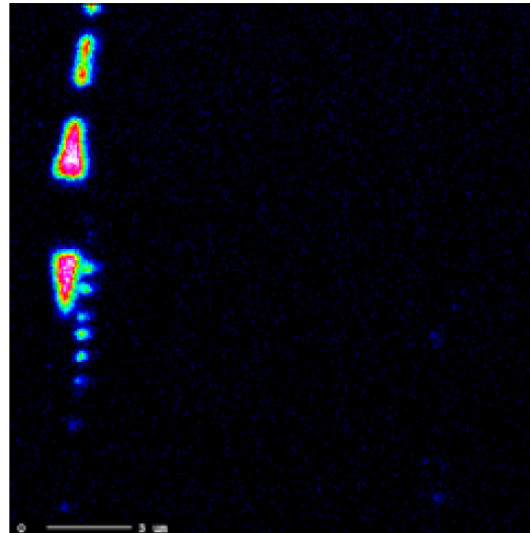
P4: SE-image



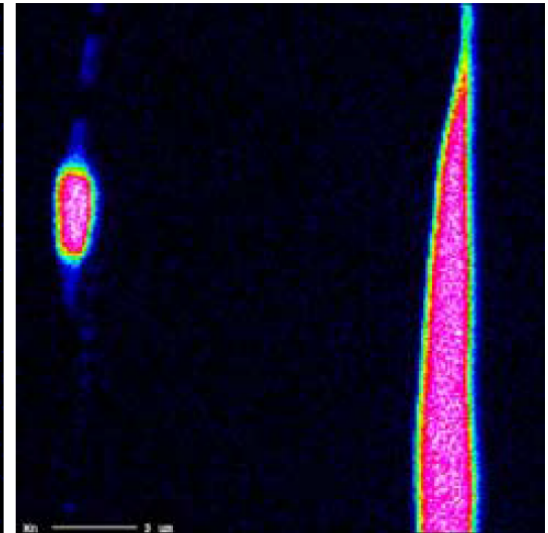




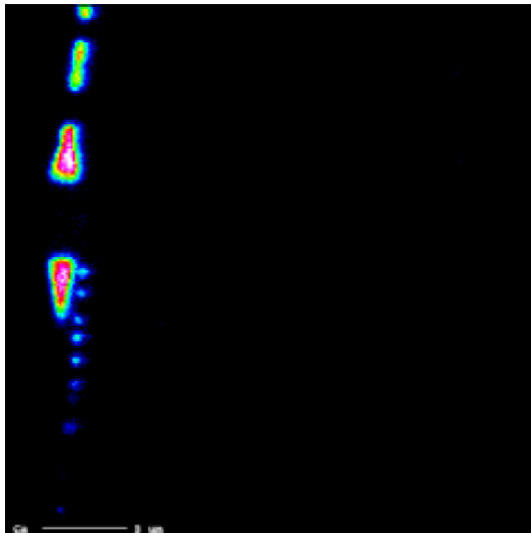
O



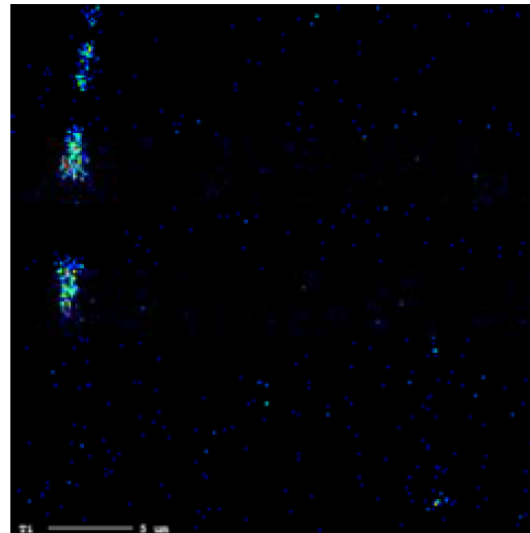
Ca



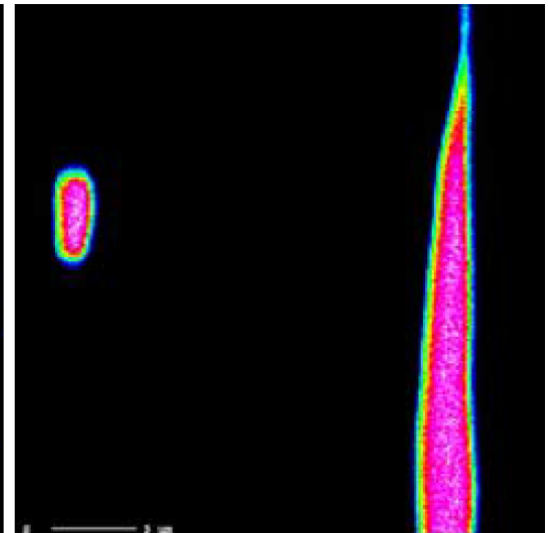
Mn



Si

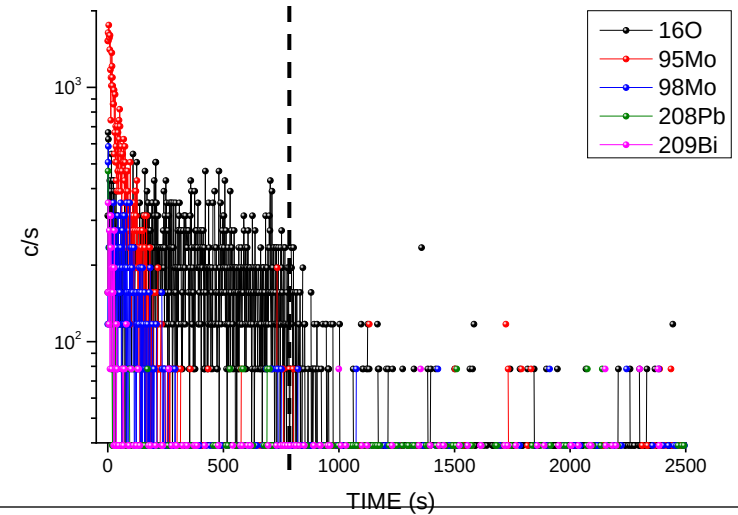
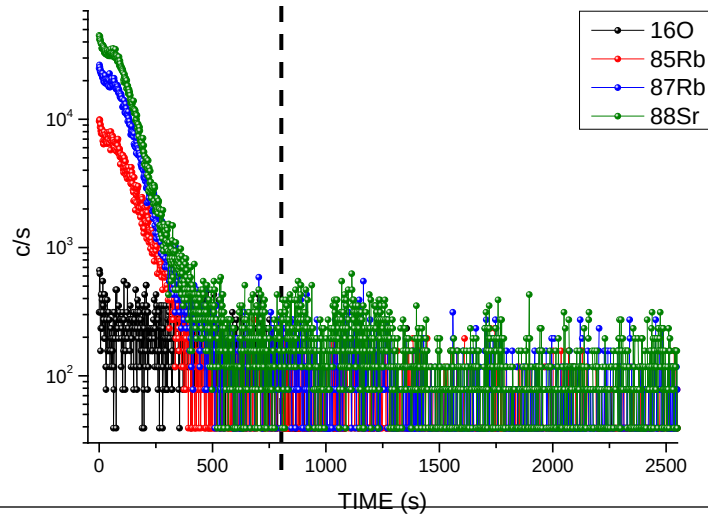
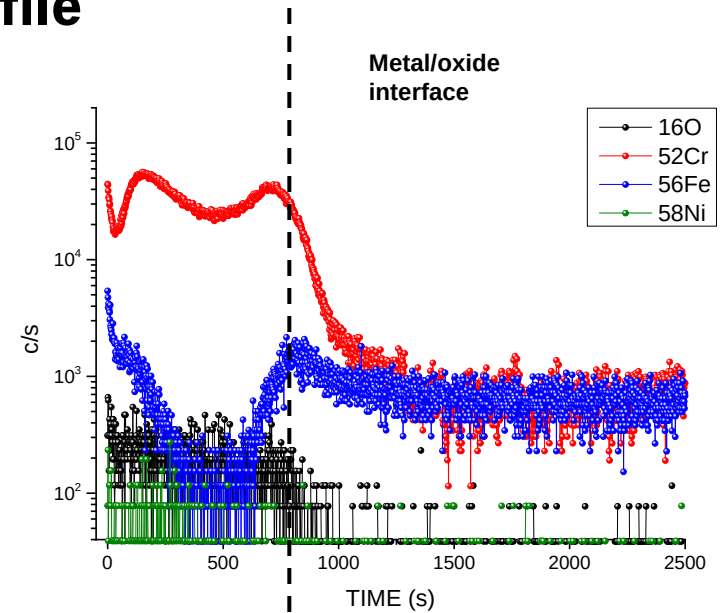
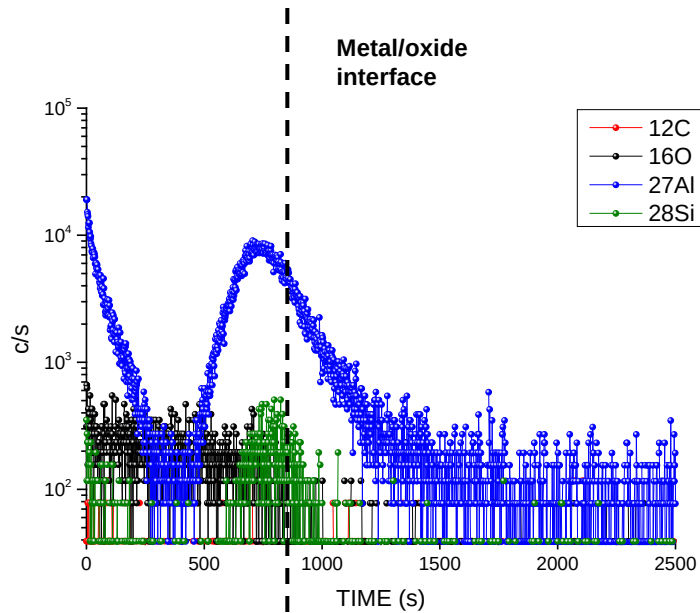


Ti



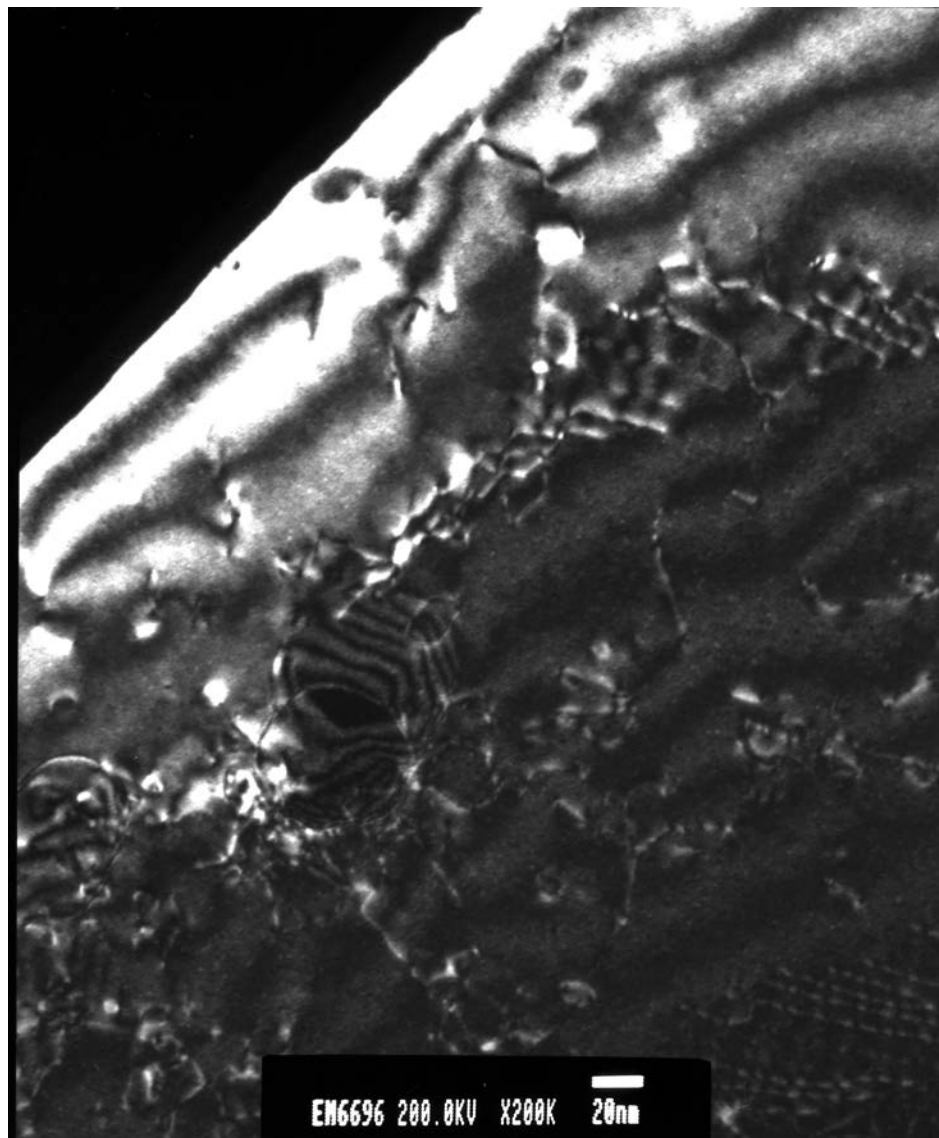
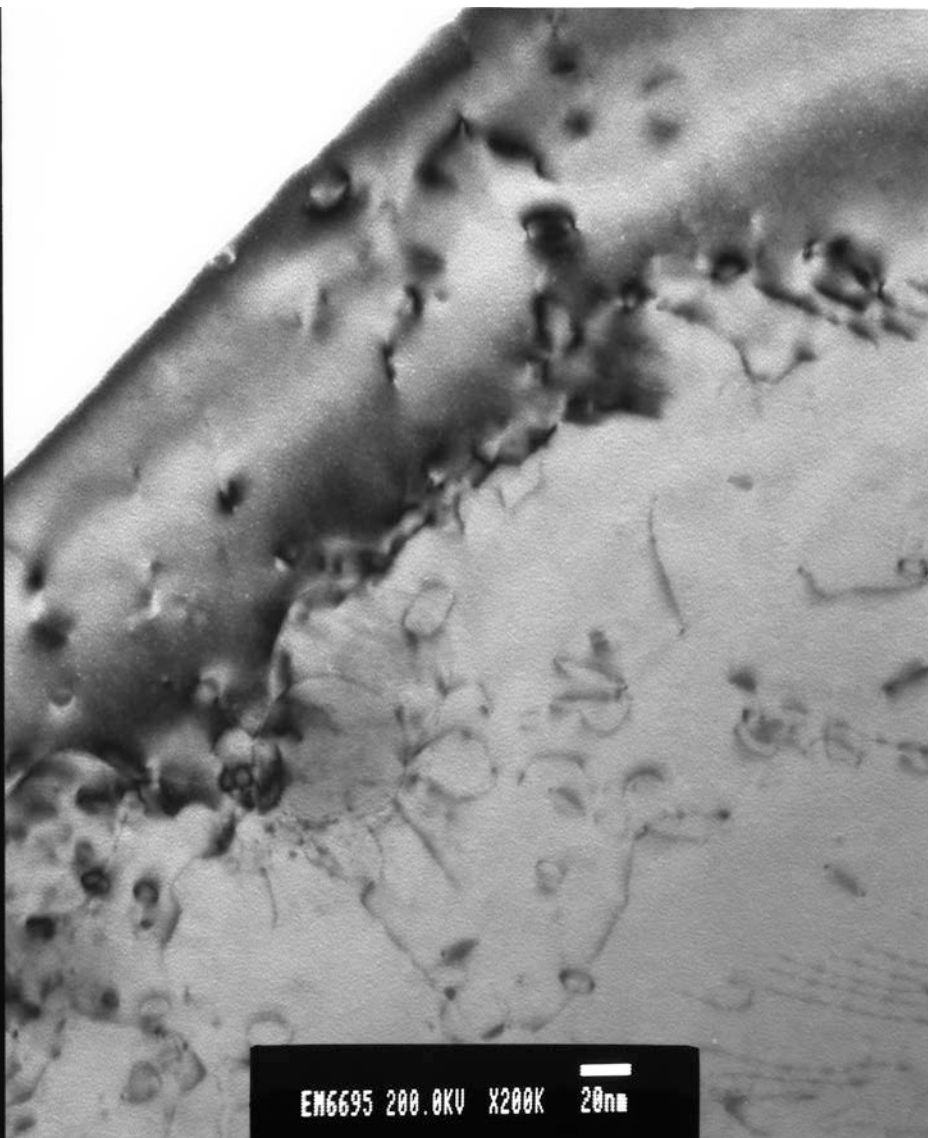
S

Depth profile

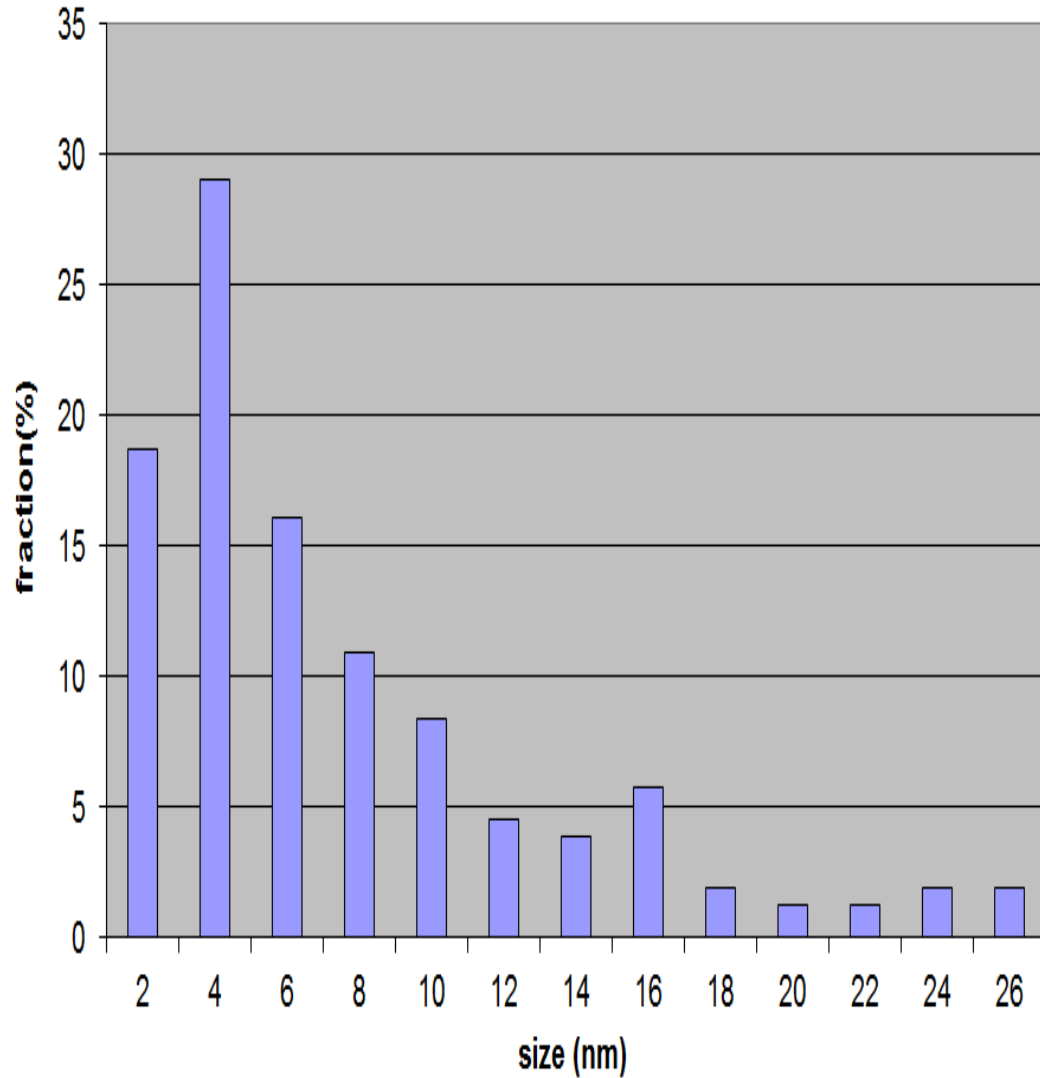


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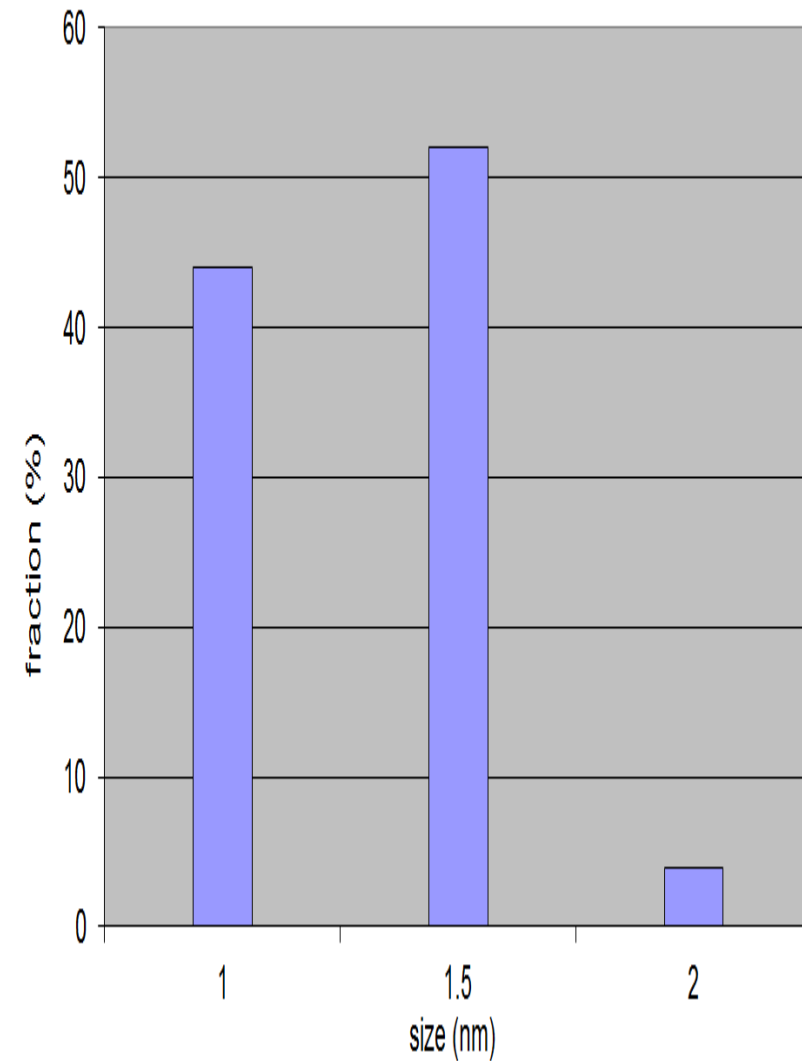
TEM observation: T91 calotte (6.5 dpa, 325° C)



Size distribution of loops and bubbles

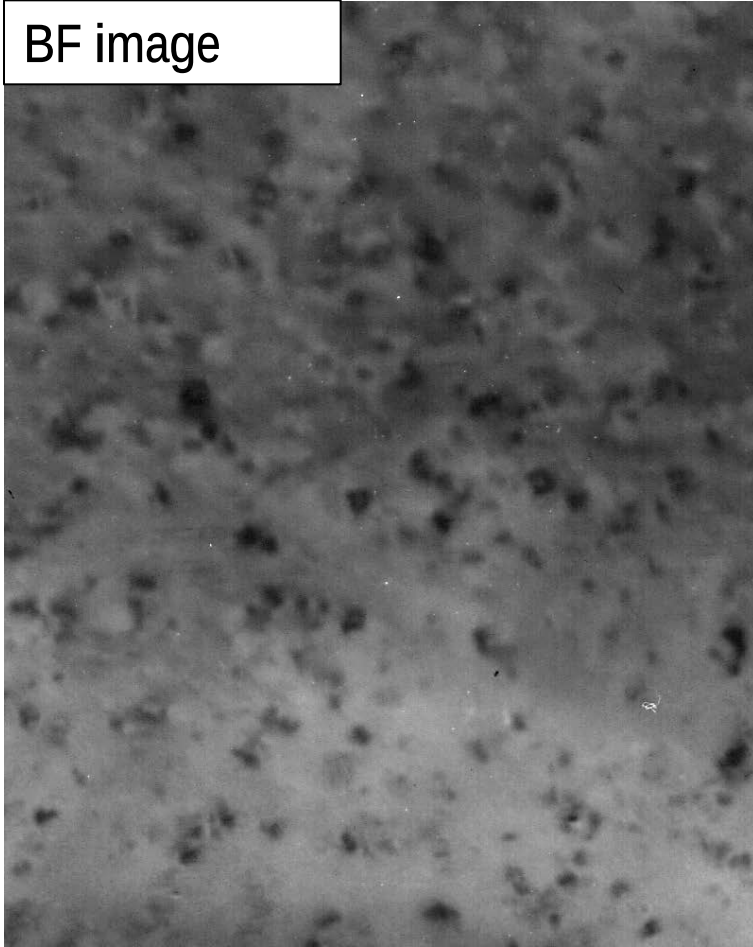


H02-10-1-A bubble size distribution



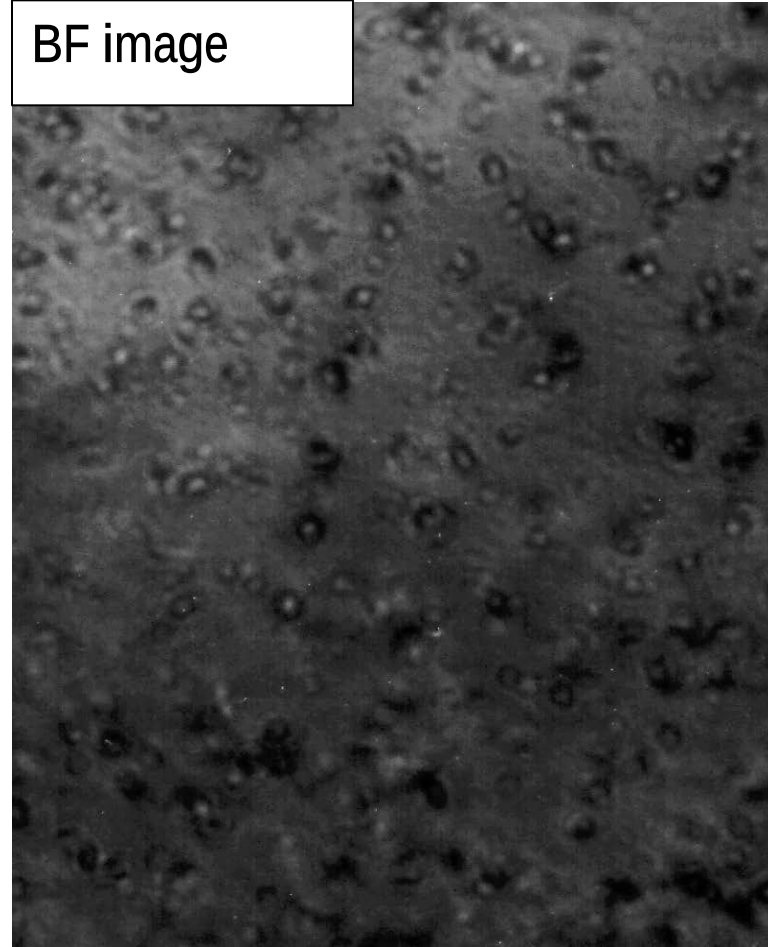
Frank loops

BF image



Cavities

BF image

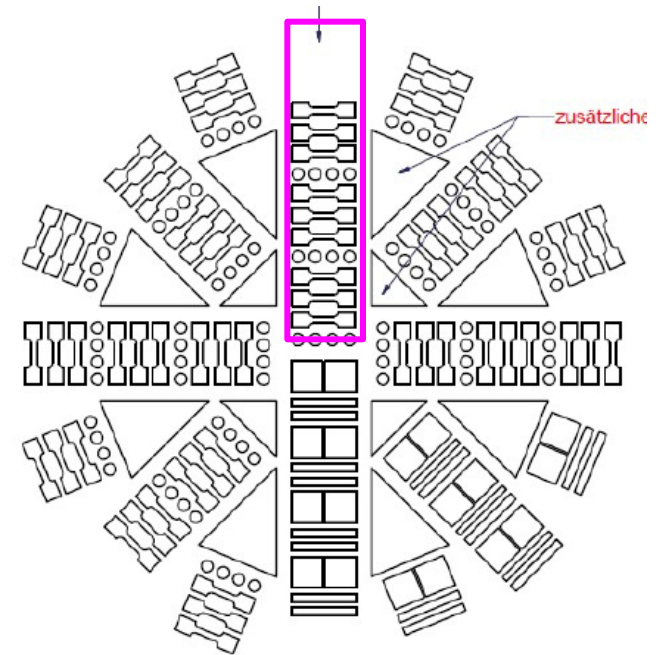
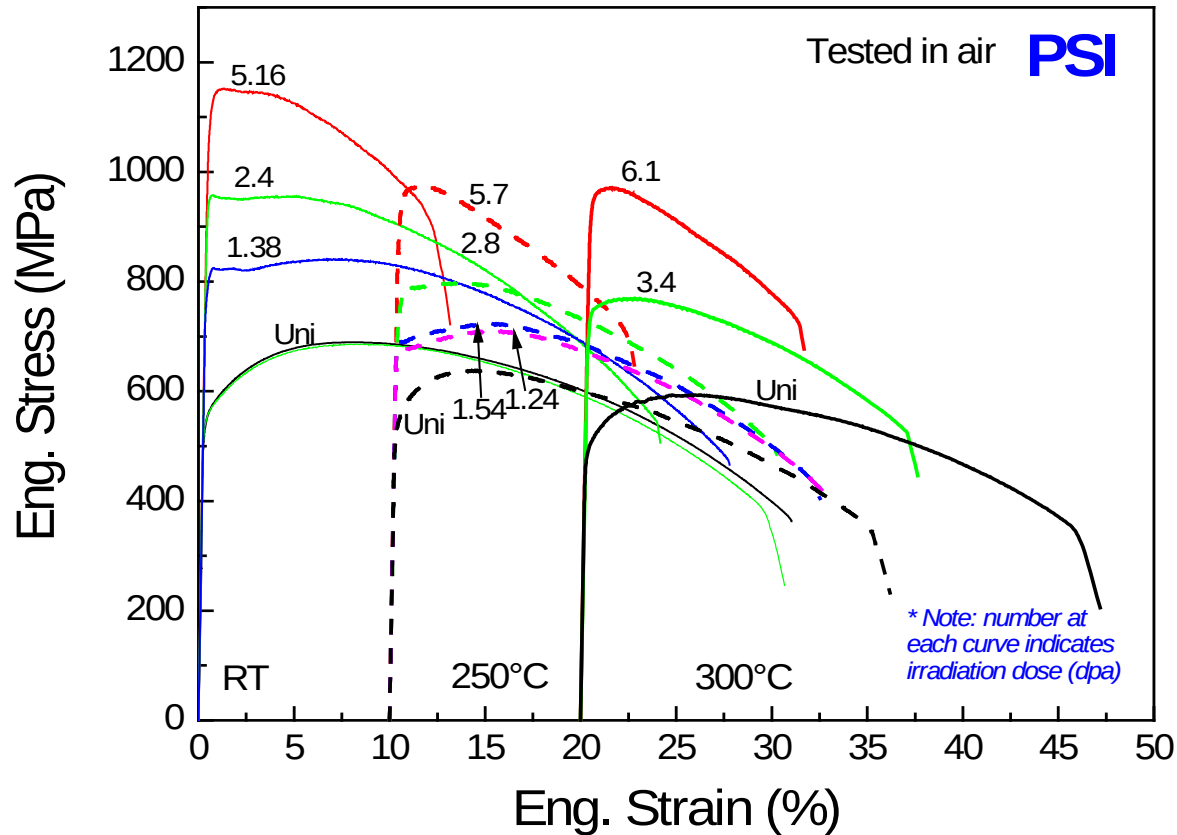


100nm

- High number density Frank loops and cavities.

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Eng. strain-stress tensile curves of specimens of MEGAPIE T91 Calotte



Thank you
