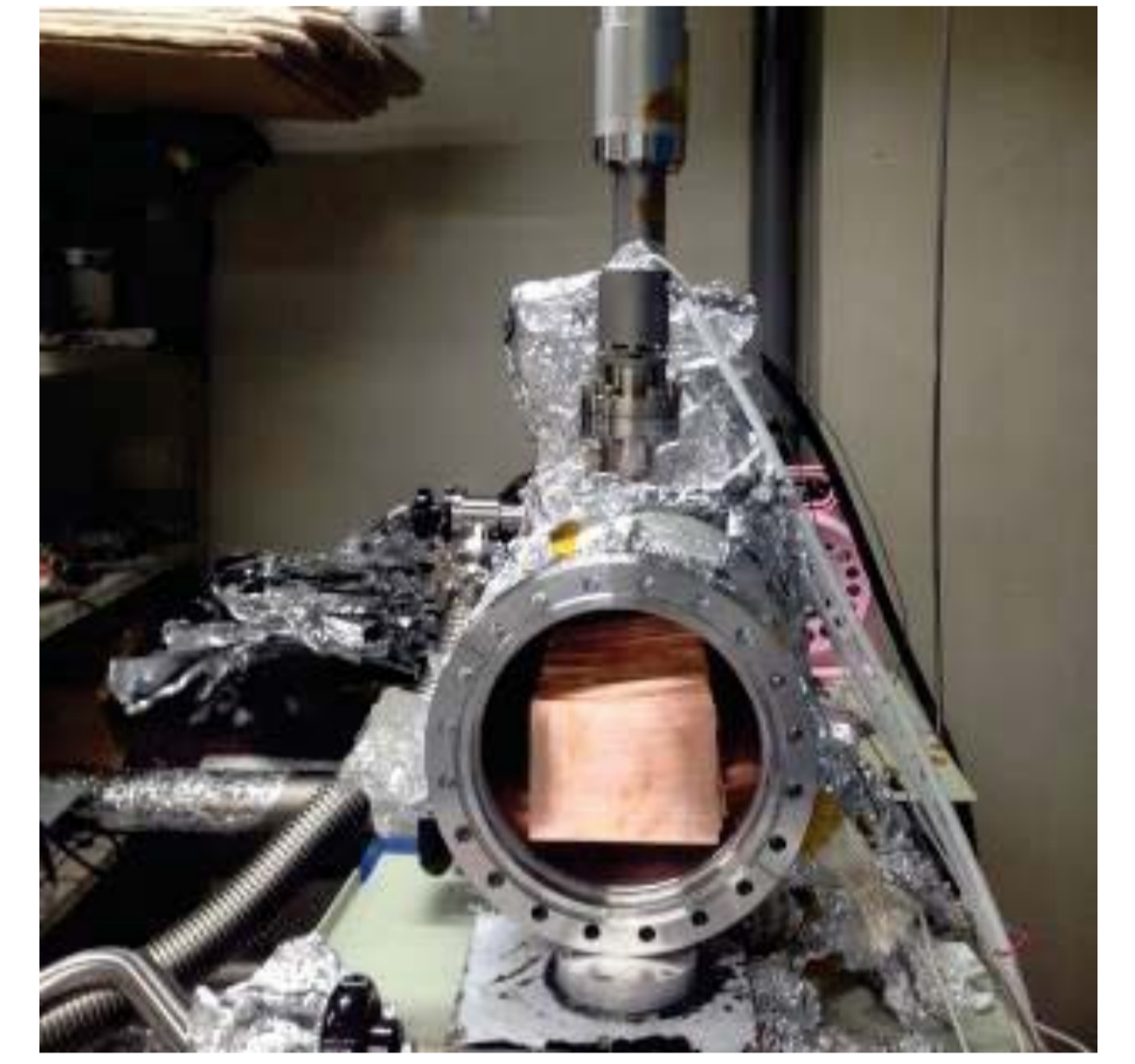
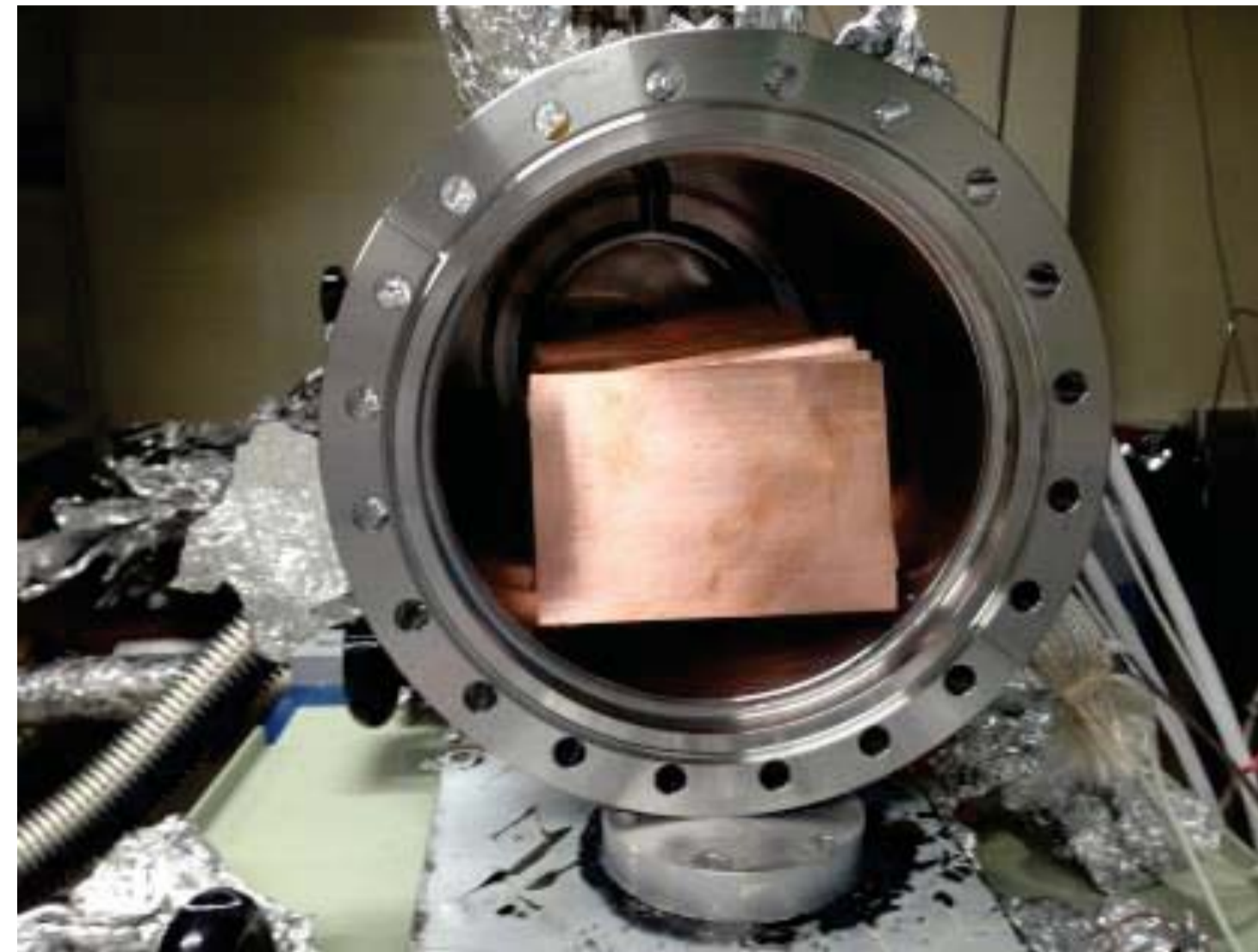


Abstract

Taiwan Photon Source (TPS) project in National Synchrotron Radiation Research Centre (NSRRC) has reached 500mA design goal. Several upgrades and design enhancements is also under development. CuCrZr copper alloy has been selected to examine its UHV compatibility, machinability and high heat load sustainability. Most importantly, the absorber is made entirely by CuCrZr (including two end flanges) and installed in the mid-section of double minimum of tandem EPU48 undulators to shadow beam miss-steered synchrotron radiation from upstream EPU. Both the result and fabrication time (without brazing) are promising.

Property	OFHC	GlidCop [®]	CuCrZr[2]
Conductivity (W/cm ^{°K})	3.83	3.65	3.23
Thermal expansion(m/ ^{°K} ×10 ⁻⁶)	16.6	17	18.6
Poisson ratio	0.31	0.35	0.18
Yield strength (Gpa)	0.049-0.078	0.33	0.27-0.44
Tensile strength (Gpa)	0.215-0.254	0.42	0.37-0.47

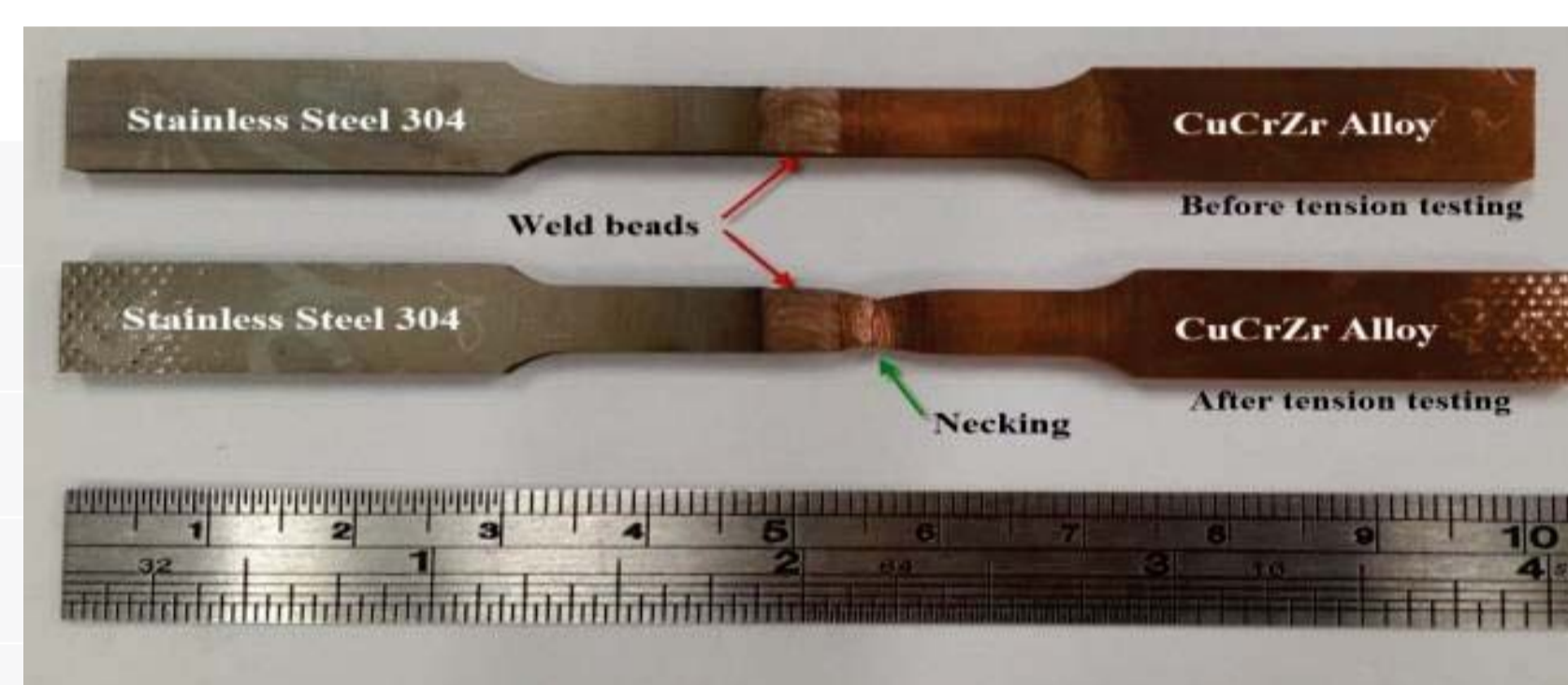


CuCrZr sample outgassing test

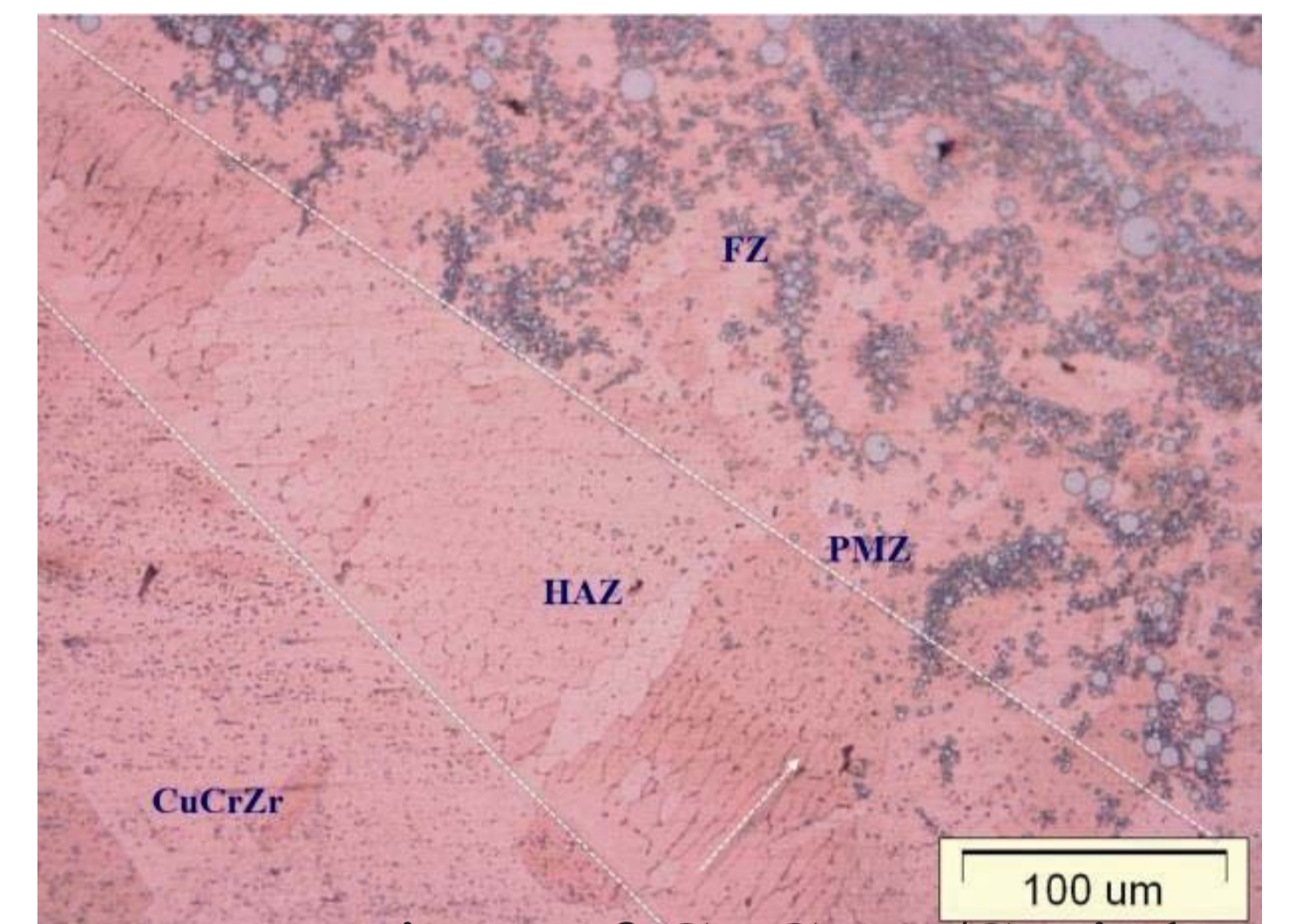
Mechanical properties

Material	Outgassing rate (Pa m s ⁻¹)	
	Q ₁₀	Q ₇₂ [*]
CuCrZr	1.5×10 ⁻⁶	5.8×10 ⁻⁶
Aluminium	3.3×10 ⁻⁶	1.6×10 ⁻⁶
Stainless Steel	1.8×10 ⁻⁶	1.6×10 ⁻⁶

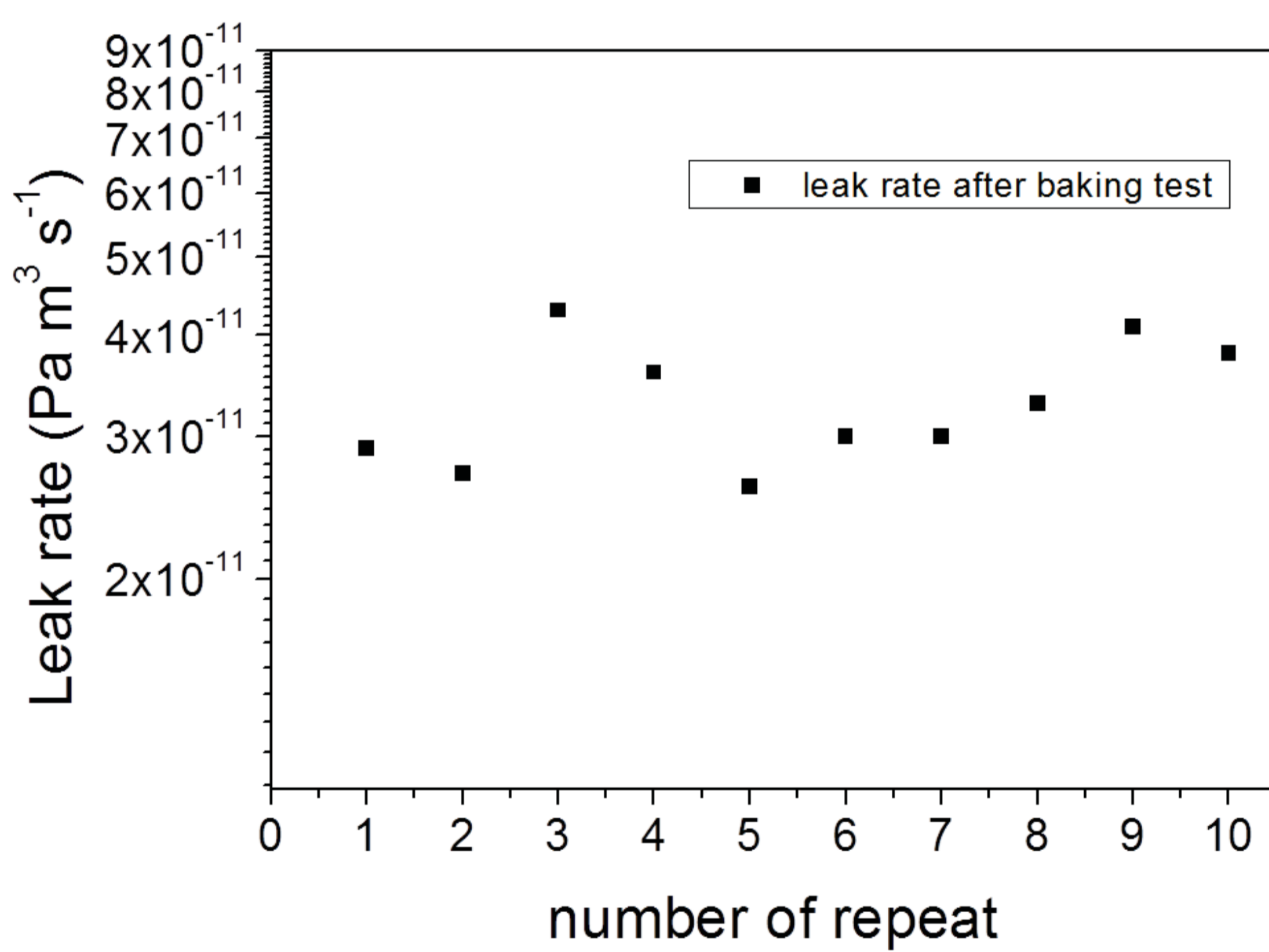
Outgassing rate of CuCrZr, Al and SST



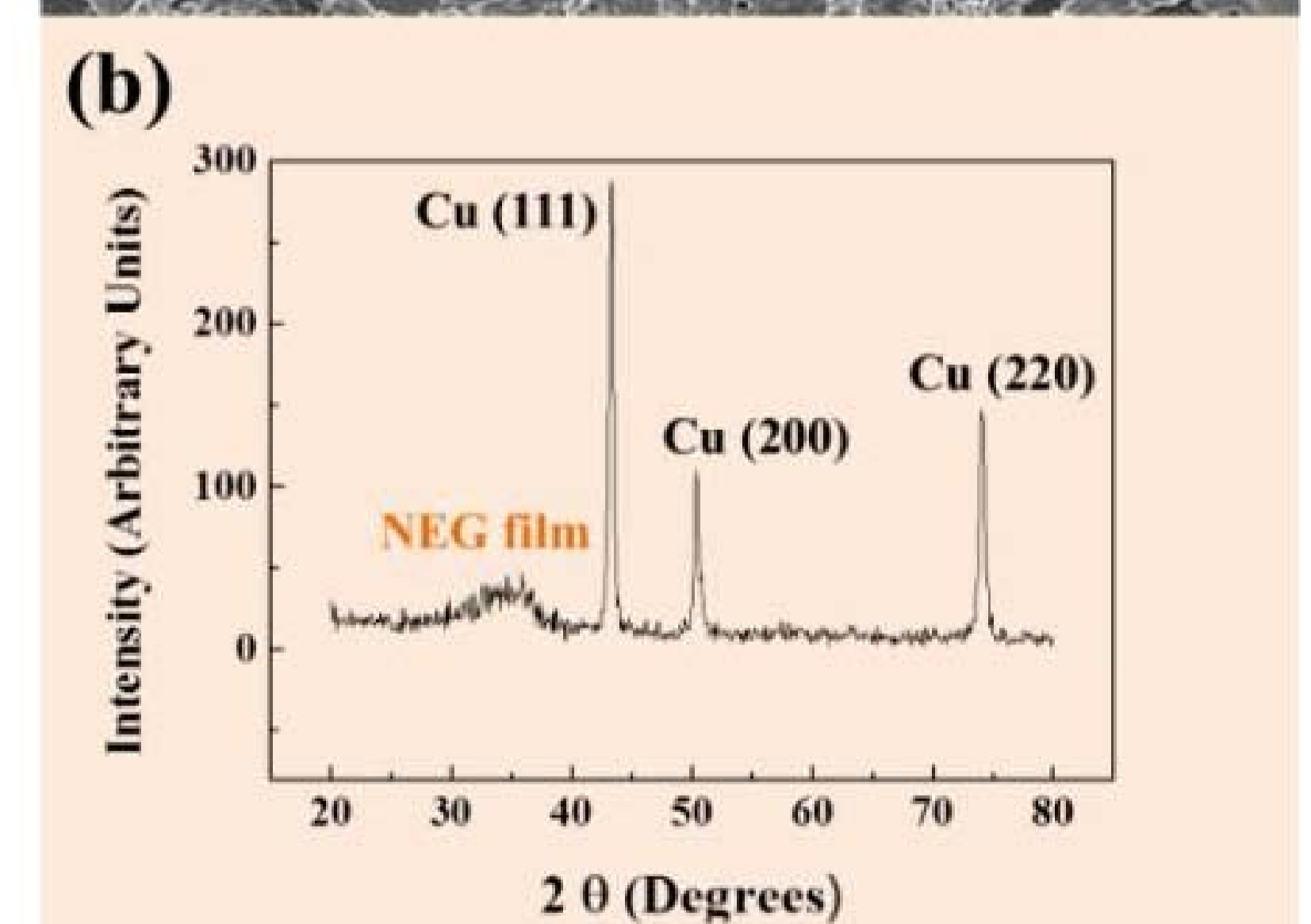
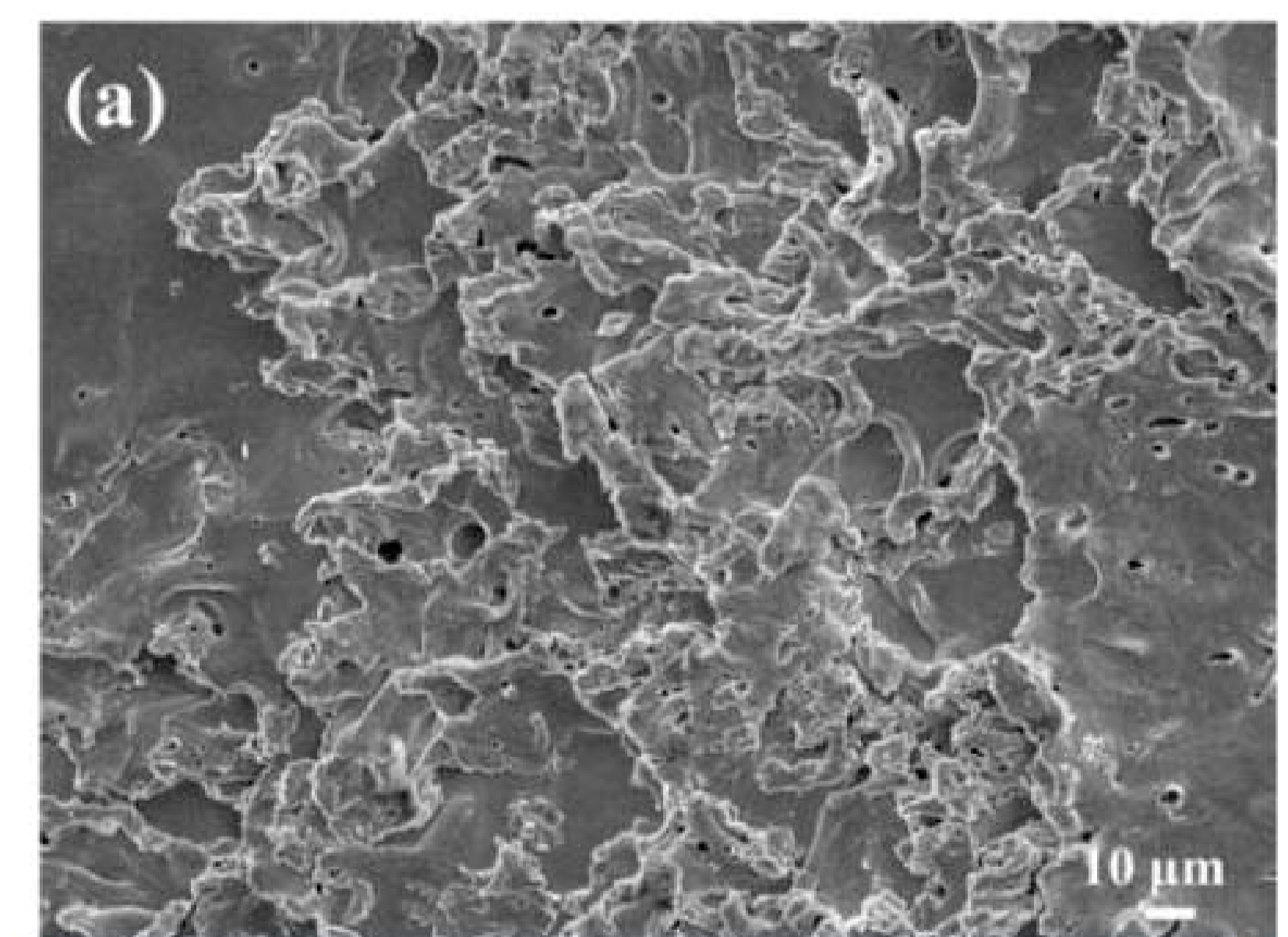
Welded CuCrZr/Stainless steel sample after tensile test



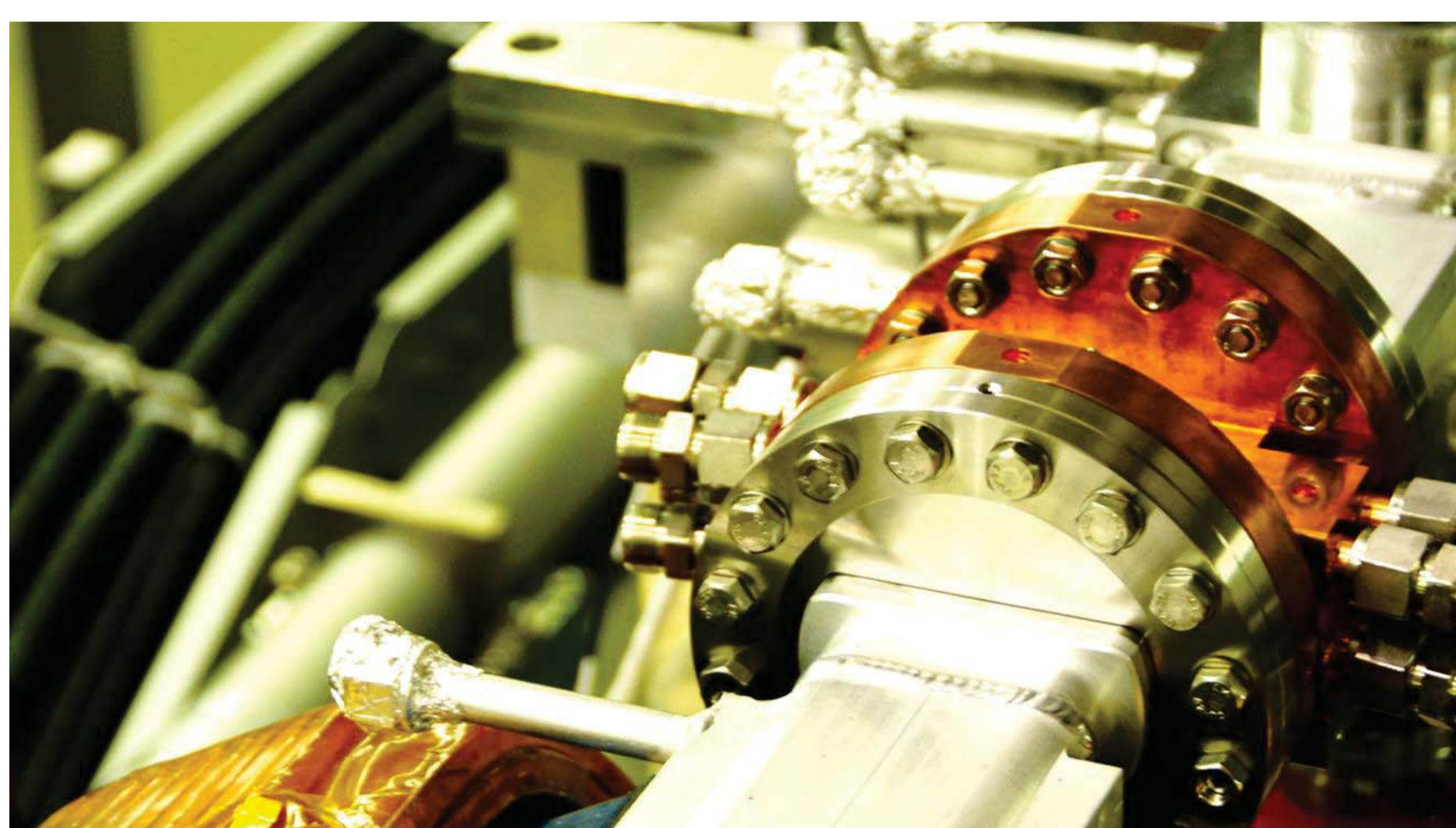
Microscope view of CuCrZr/Stainless steel HAZ area.



CuCrZr slits in TPS front end 24



CuCrZr surface morphology



CuCrZr absorber in mid-section of double-minimum EPU48s.

Conclusion

CuCrZr alloy has been test and adopted as our new candidate for high heat load components in TPS. Its UHV compatibility has been proved by our outgassing rate test. By carefully controlled welding parameters we are able to TIG weld the alloy with stainless steel. Tensile test has also been carried out to ensure its weldability; primary research on NEG coating on CuCrZr alloy is also studied.

Two high heat load components, TPS double-minimum EPU48 mid-section transition absorber and front end 24 water cooled slits are made in one full CuCrZr piece of material and have been installed in 2016 summer shutdown maintenance. They will be used as first touchstone to verify using this alloy as our next generation high heat load components.