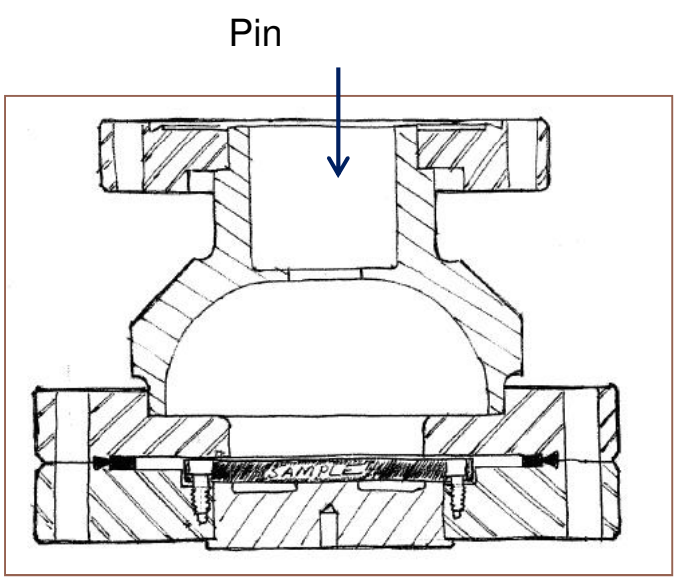
SEM Report on Various Pulse Heating Samples and on SLAC X-Band Klystron Circuits

SLAC: L. Laurent, V. Dolgashev, A. Haase, A. Jensen, E. Jongewaard, J. Lewandowski, S. Tantawi, C. Yoneda, D. Yremian

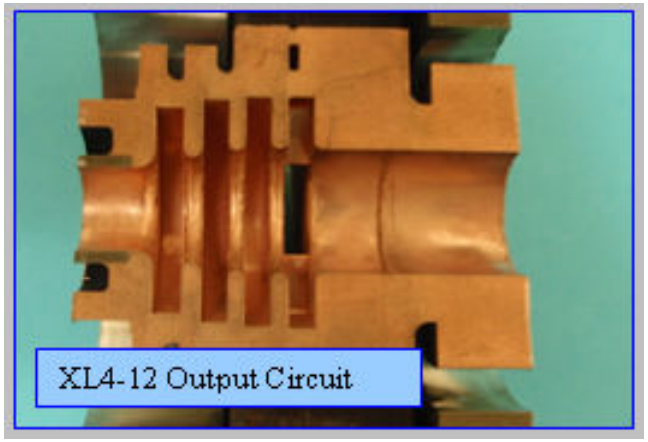
CERN: M. Aicheler, G. Izquierdo, S. Heikkinen,

KEK: Y. Higashi

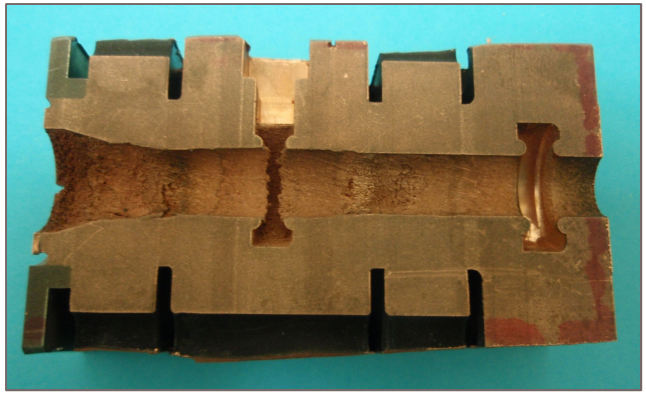
Pulsed Heating Cavity



XL and XP Klystron Circuits



XL4-7 Input Circuit



Cavity Pulsed Heating Experiments

SLAC: L. Laurent, V. Dolgashev, J. Lewandowski, S. Tantawi, C. Yoneda, D. Yremian

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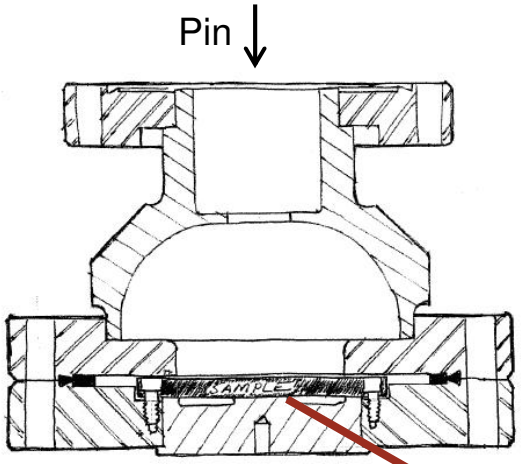
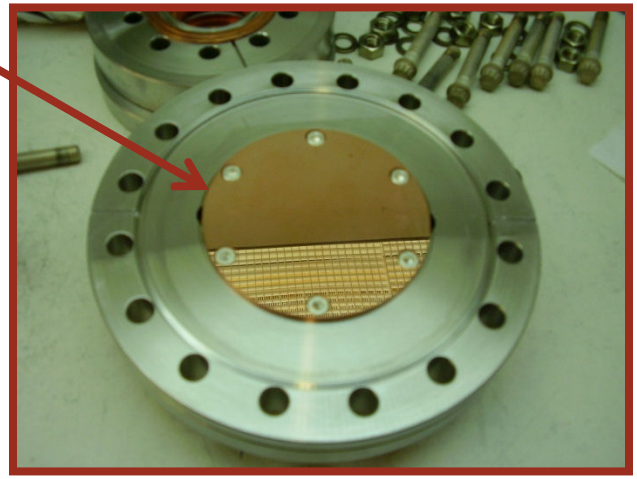
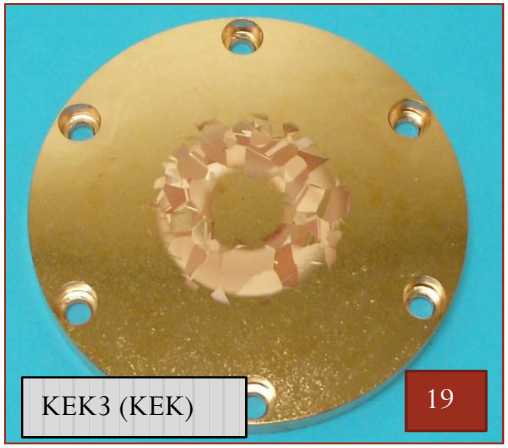
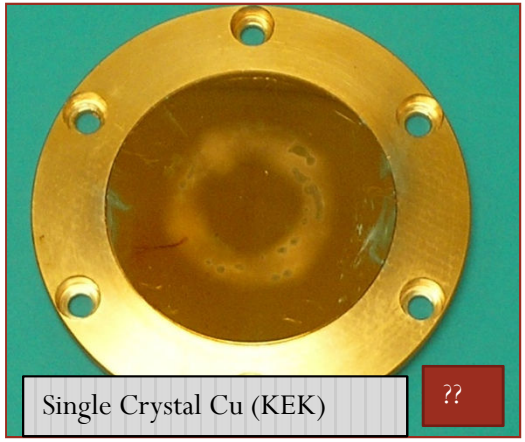


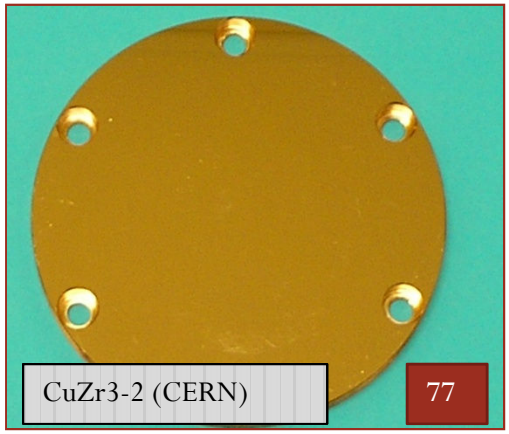
3-inch diam. pulse heating sample

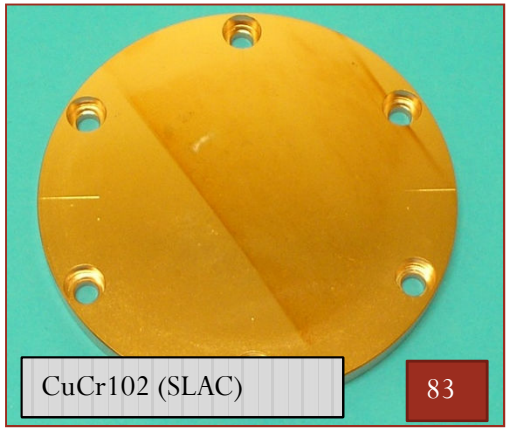


Pulse Heating Samples RF Tested and presented at CLIC08





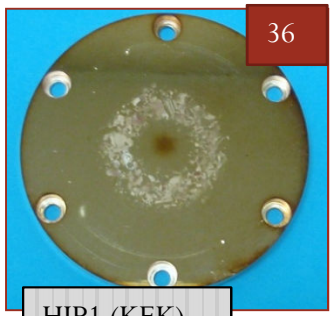


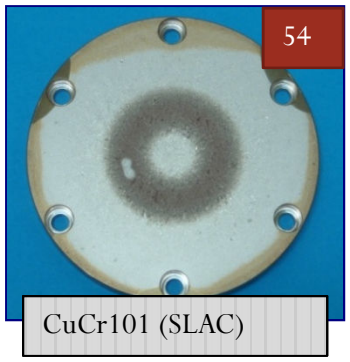


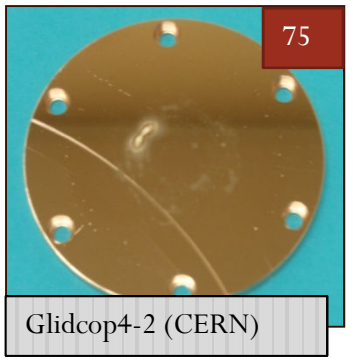
Hardness Test Value

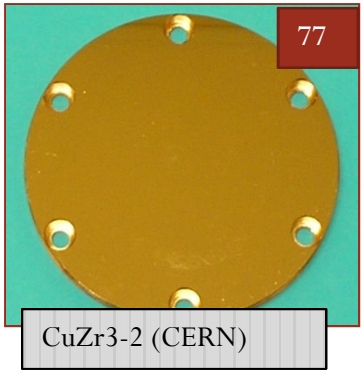
Hardness Test Value

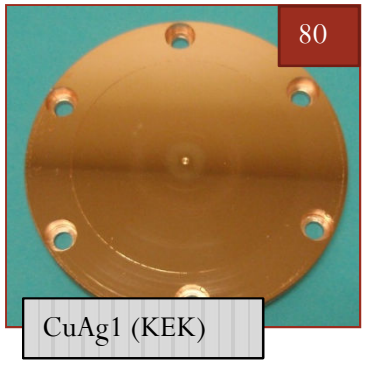
Pulse Heating Samples (CLIC09)

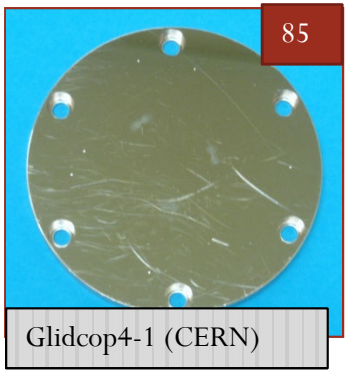




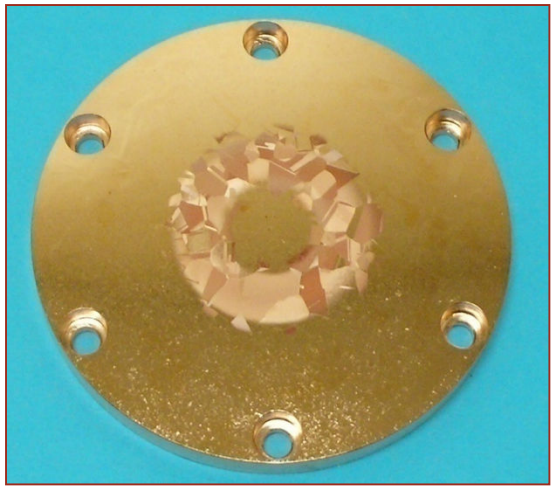


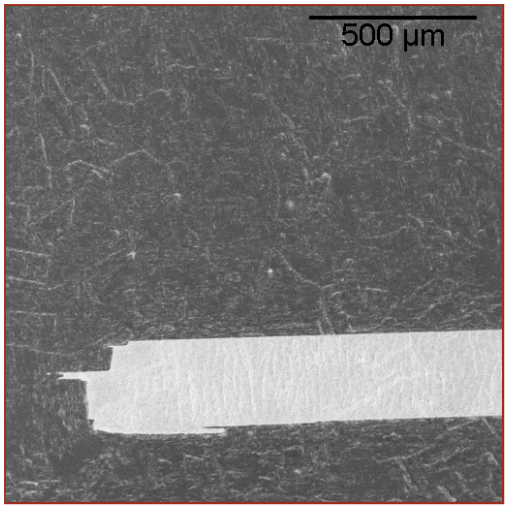






Copper (KEK3)



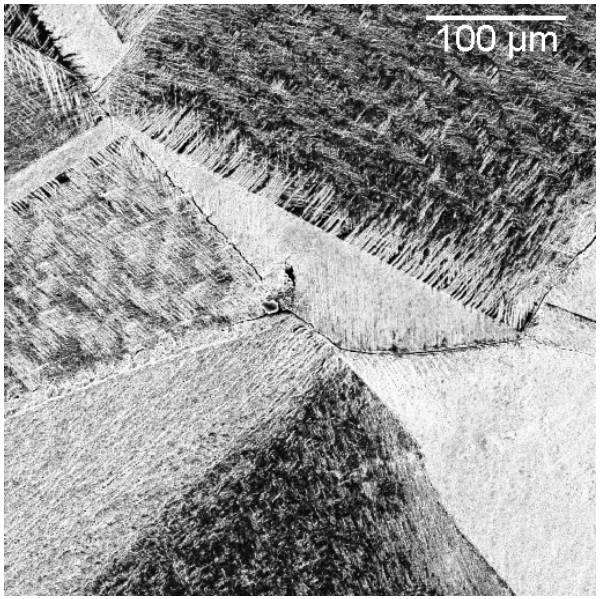


Pulse Heating Test Protocol:

10e7 Pulses

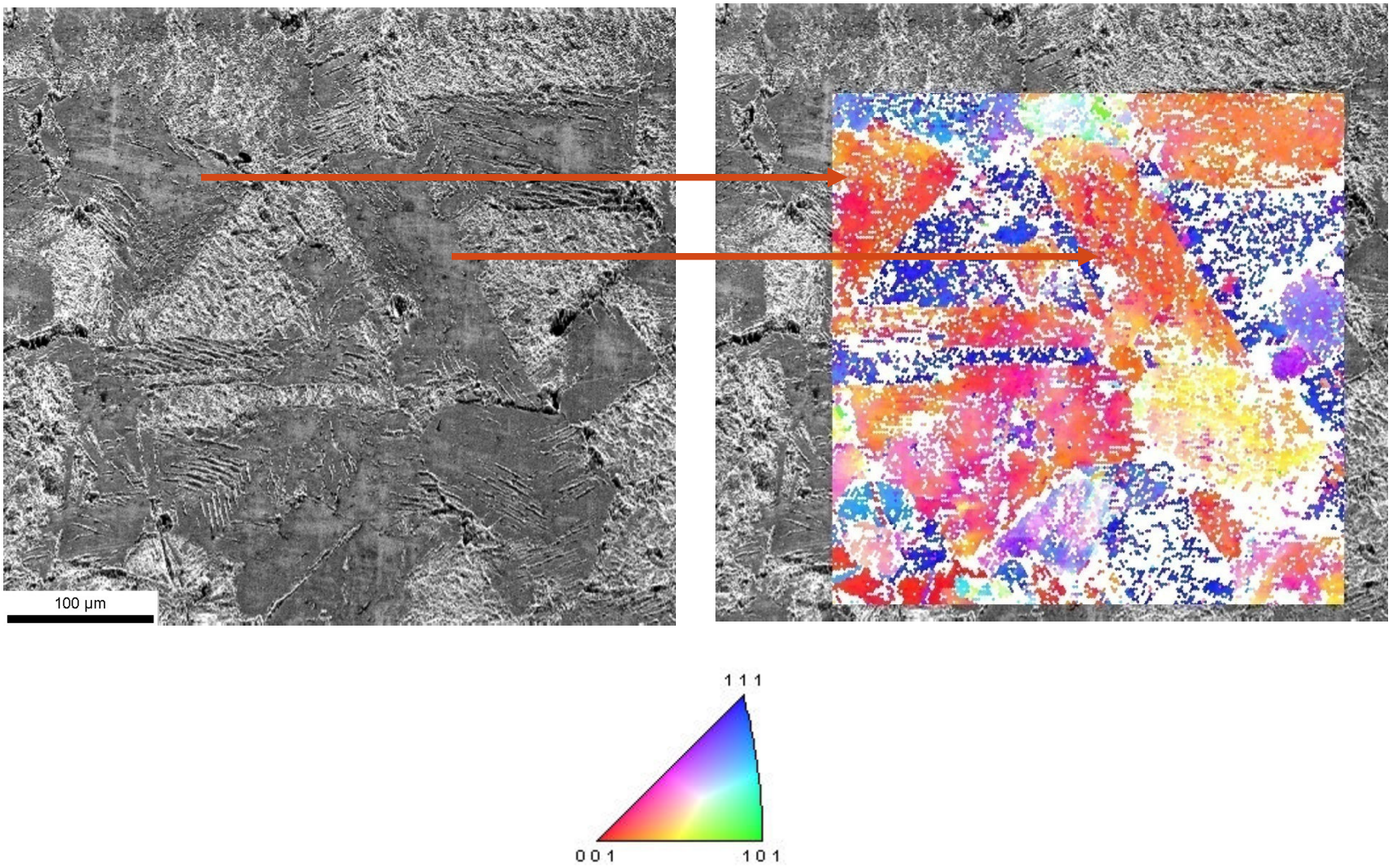
T = 110°C

HIP2 Cu (KEK)

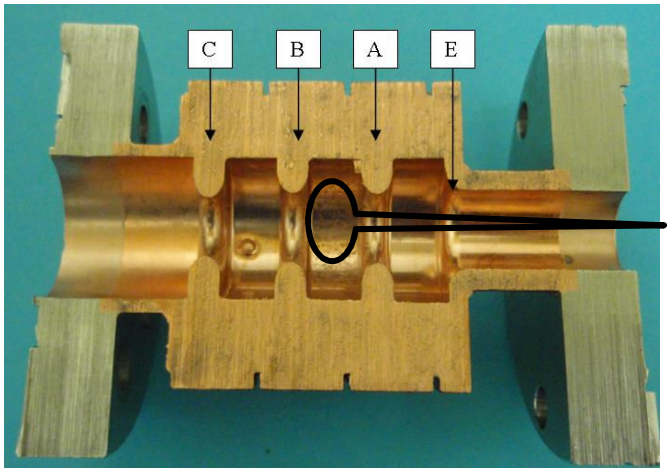


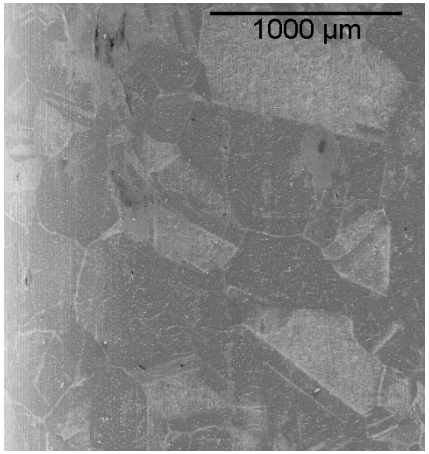
Electron Back Scattered Diffraction

Courtesy of Markus Aicheler (CERN)

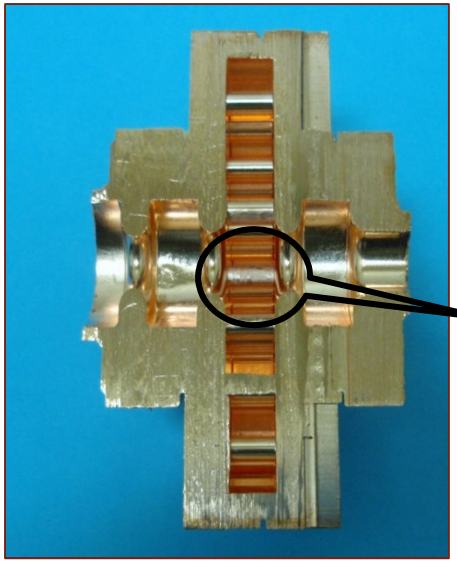


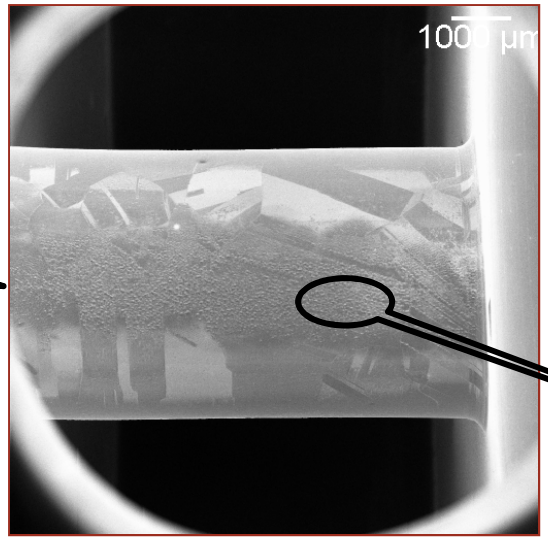
CuZr Single Cell Structure (1C-SW-A5.65-T4.6-CuZr-SLAC)

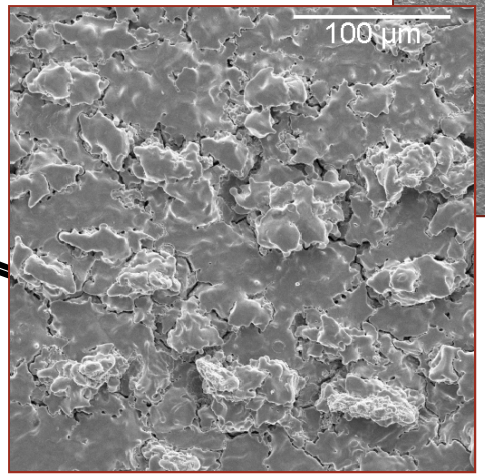


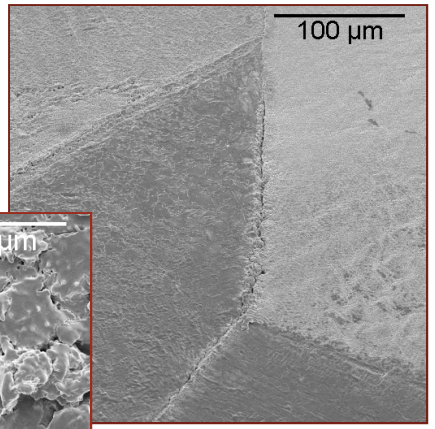


Photonic Band Gap Single Cell Structure (MIT Collaboration: R. Marsh, M. Shapiro, R. Temkin)



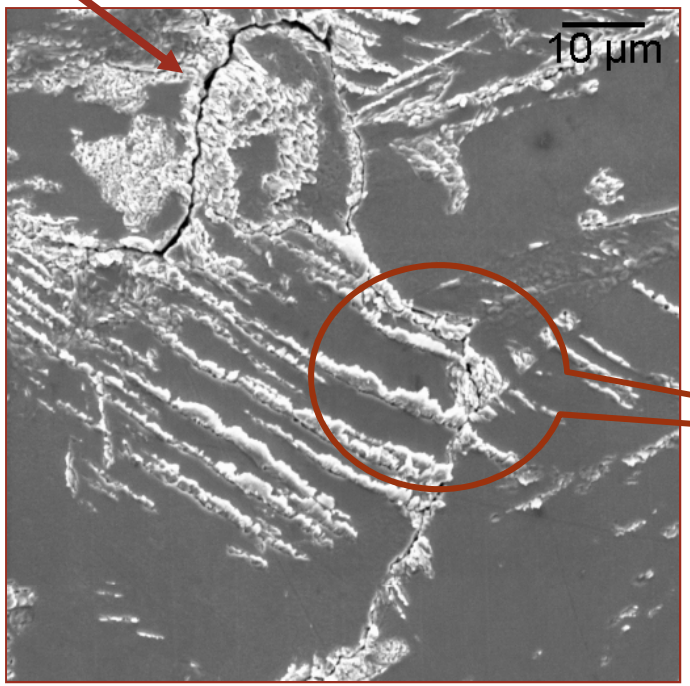


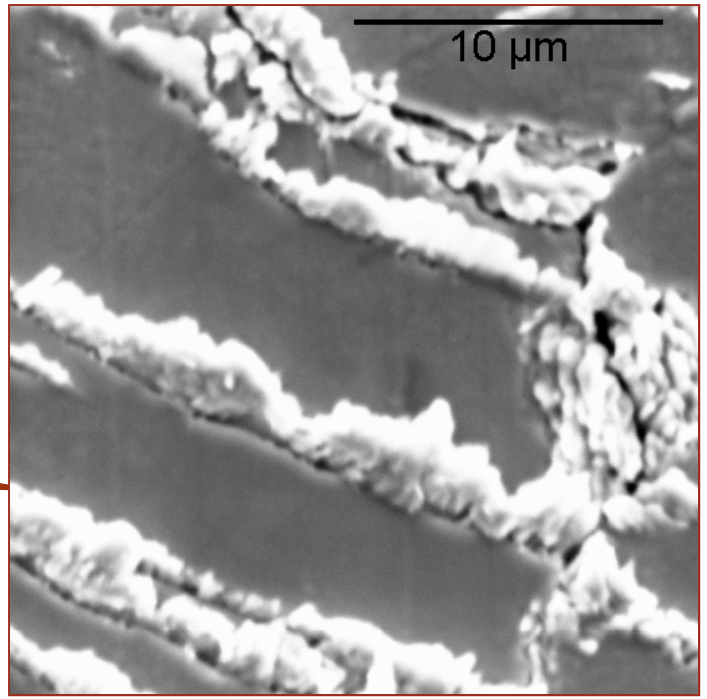




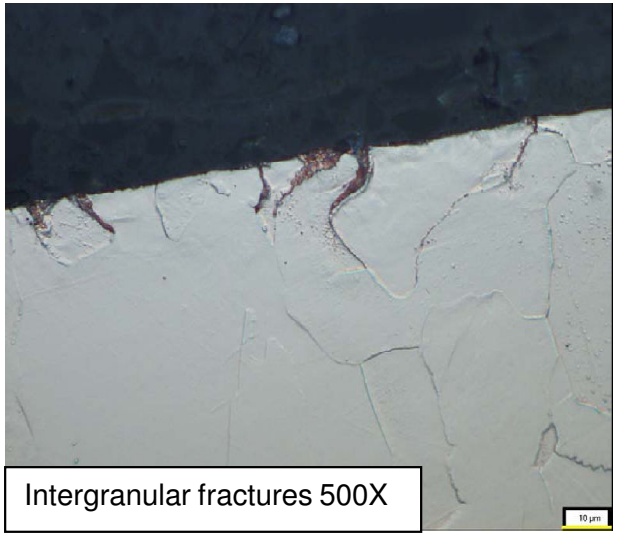
Intergranular fracture

Copper (CERN)



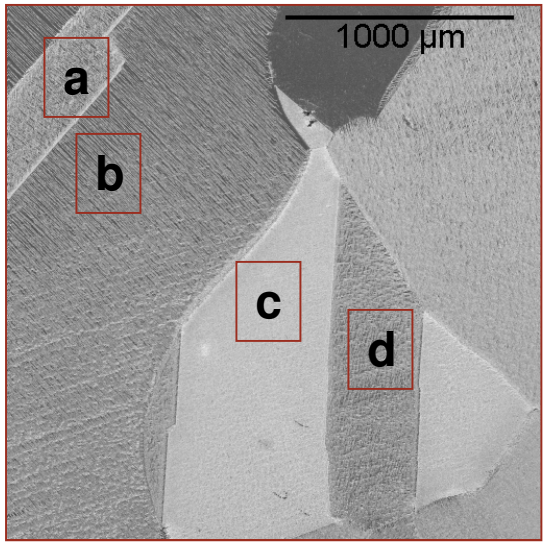


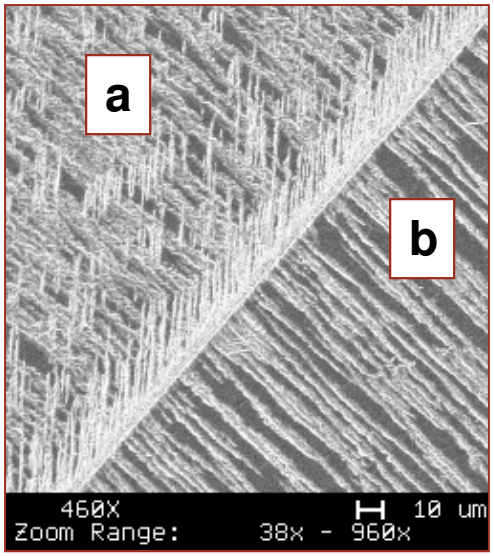
Transgranular fractures

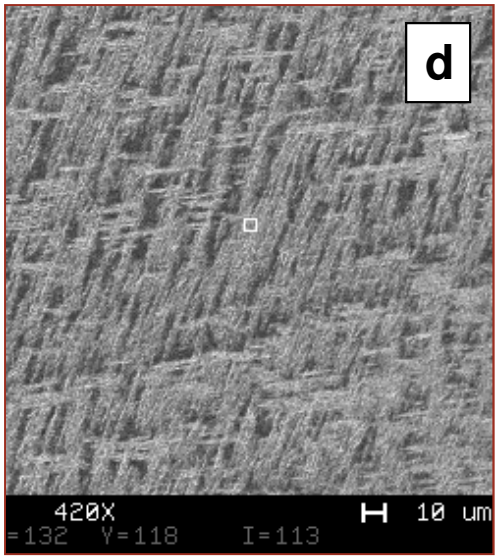


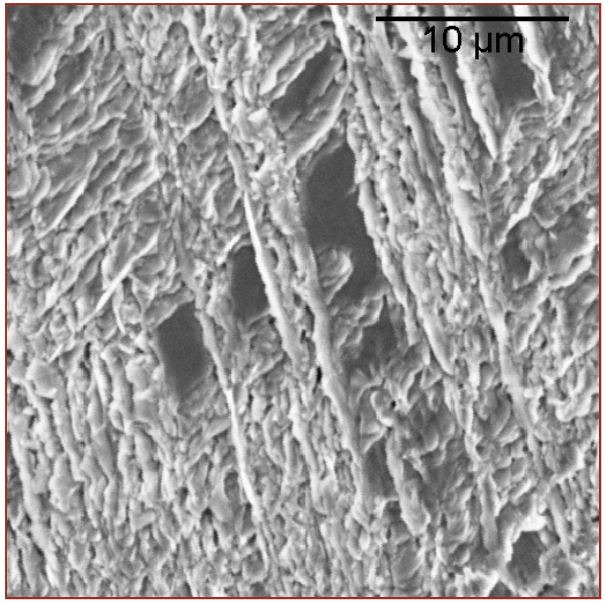
Intergranular fractures 500X

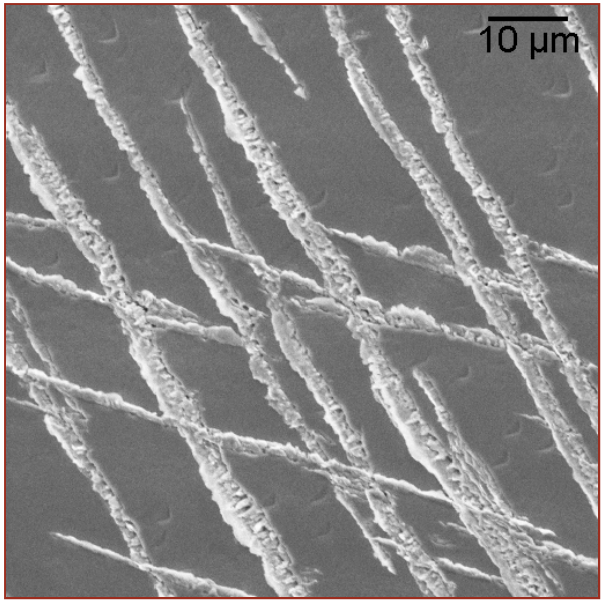
HIP2 Copper (KEK)

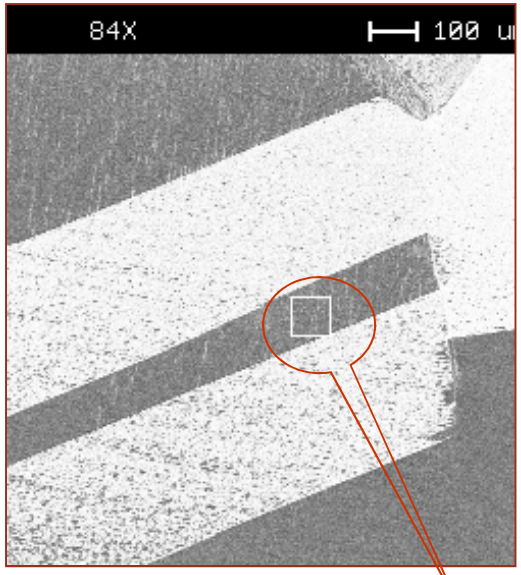




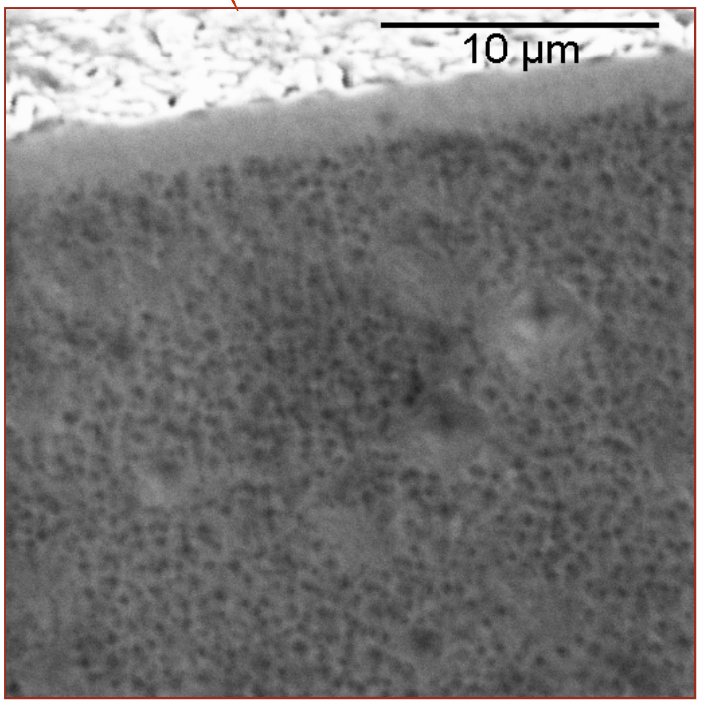




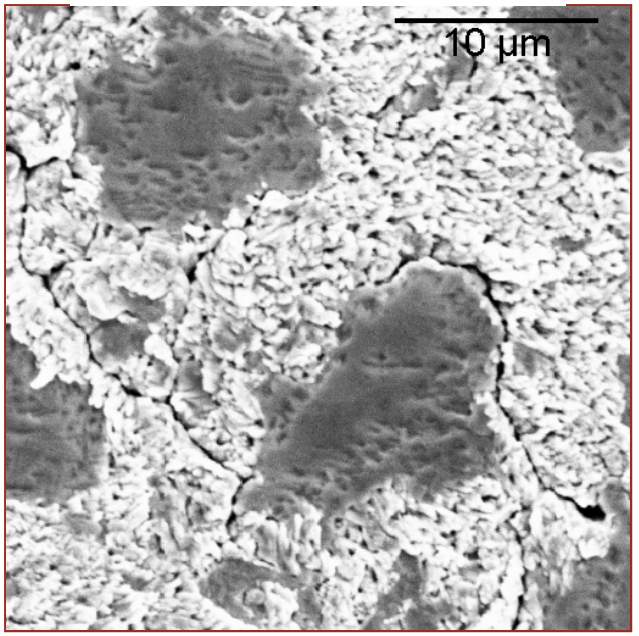


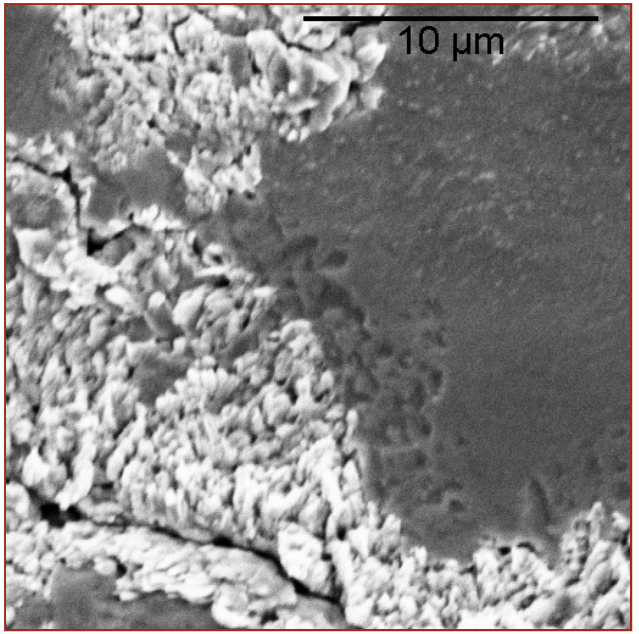


HIP2 Cu (KEK)



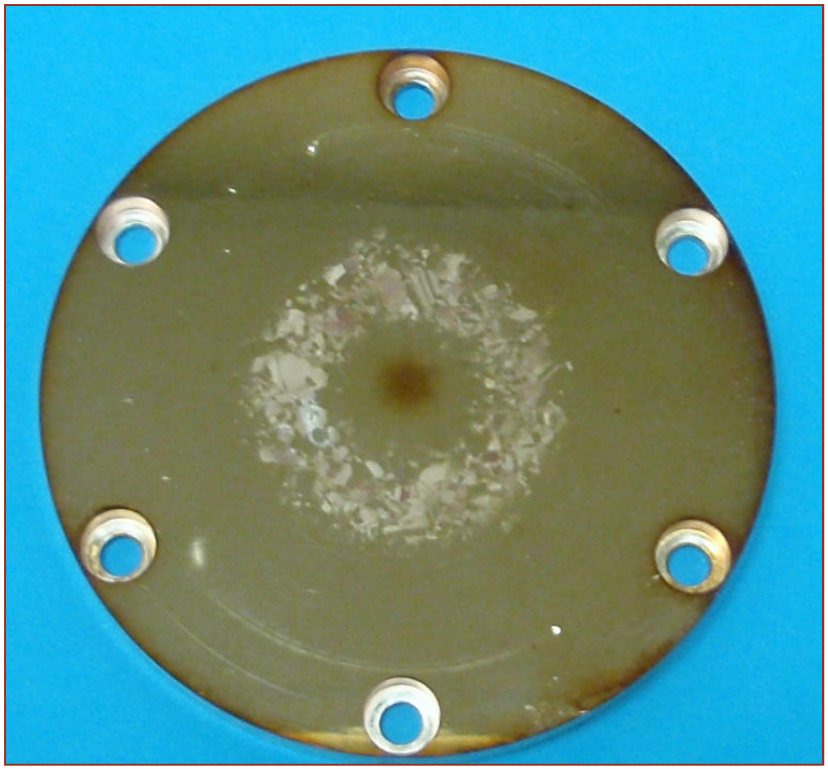
E-Deposited Cu (KEK)



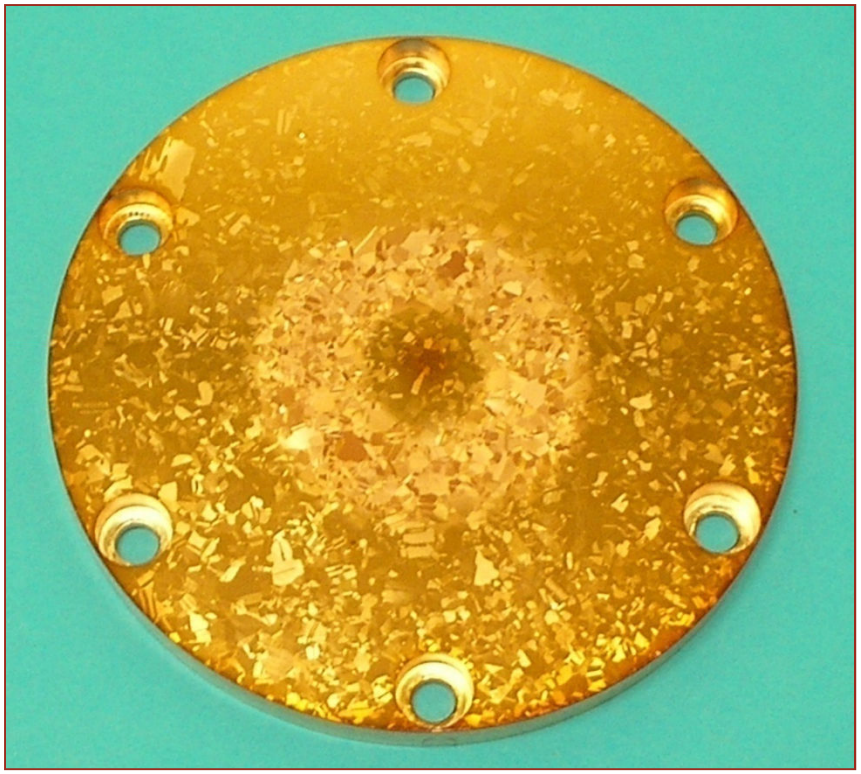


Hot Isostatic Pressed Copper (KEK): After RF Testing (T=110^{o}C)

HIP1 Copper (KEK): No Etch

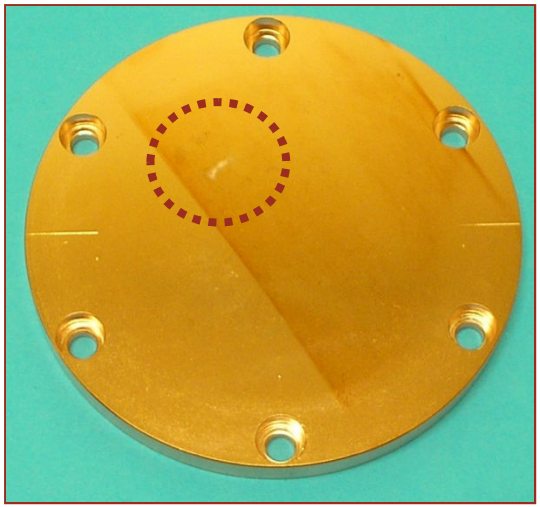


HIP2 Copper (KEK): Etched

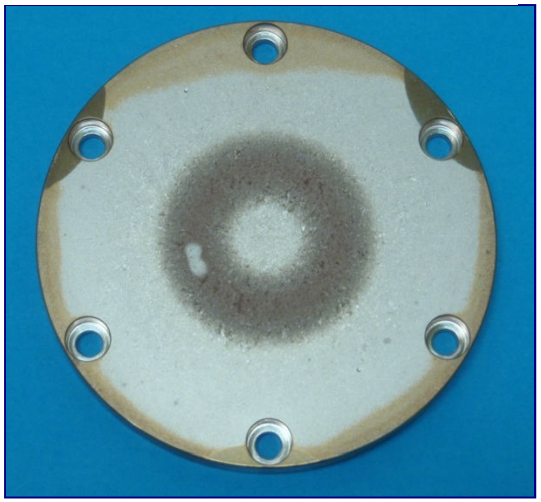


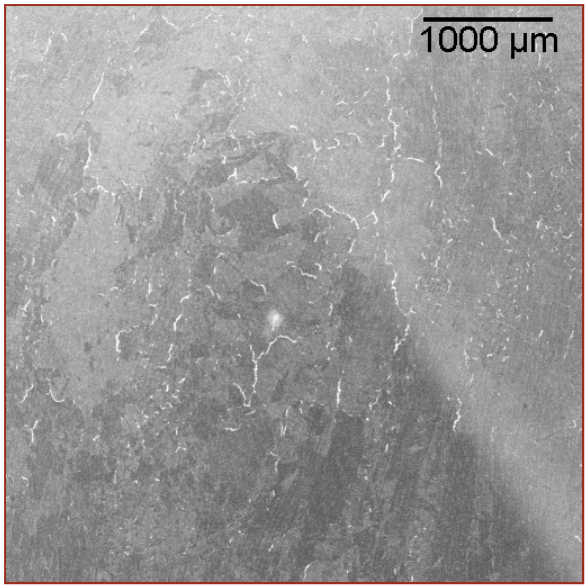
Two CuCr (SLAC): After RF Testing (T=110°C)

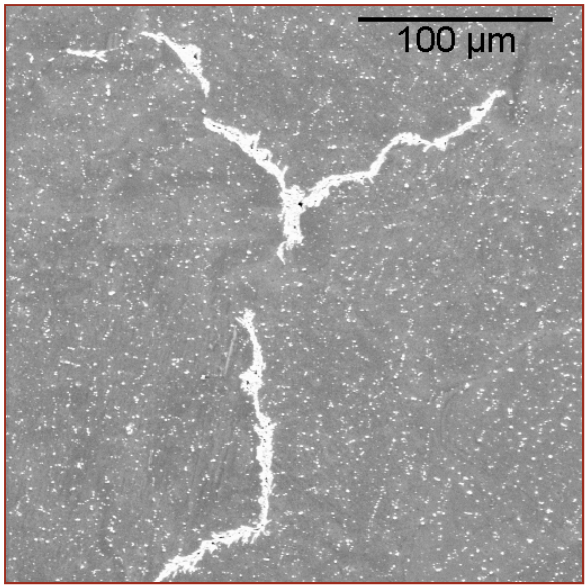
CuCr_102 No Heat Treatment



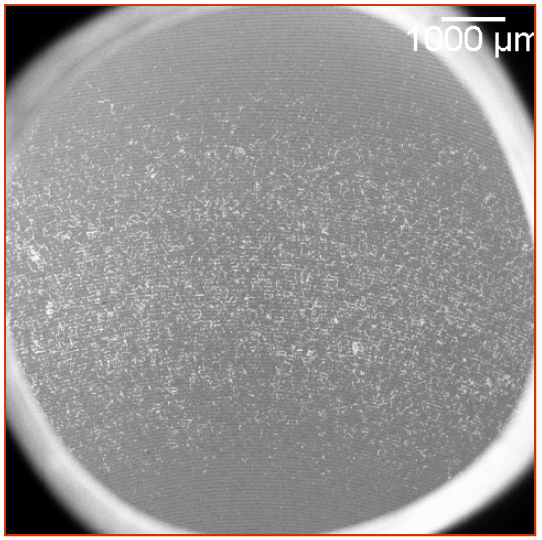
CuCr_101 Heat Treated
988°C Braze Cycle

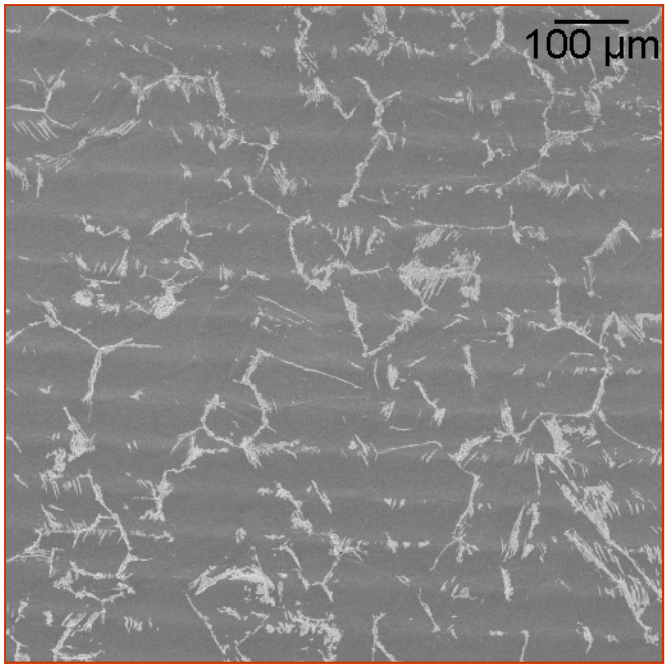


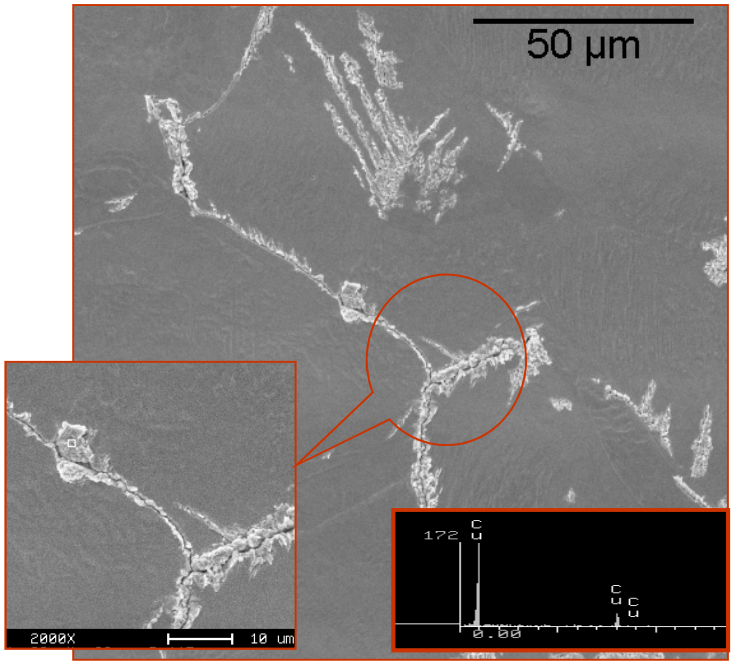




CuAg (SLAC): After RF Testing (T=110°C)

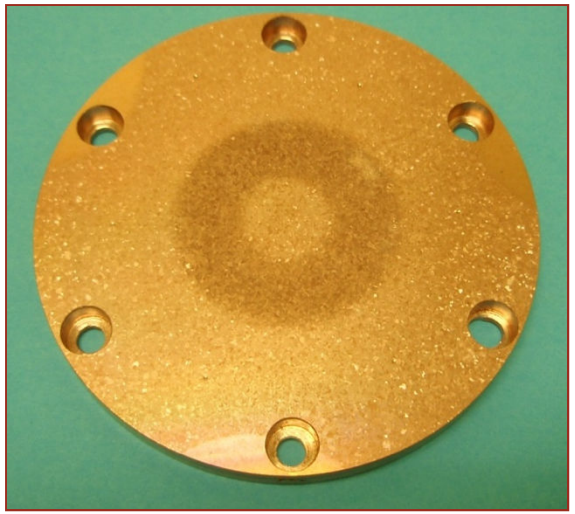






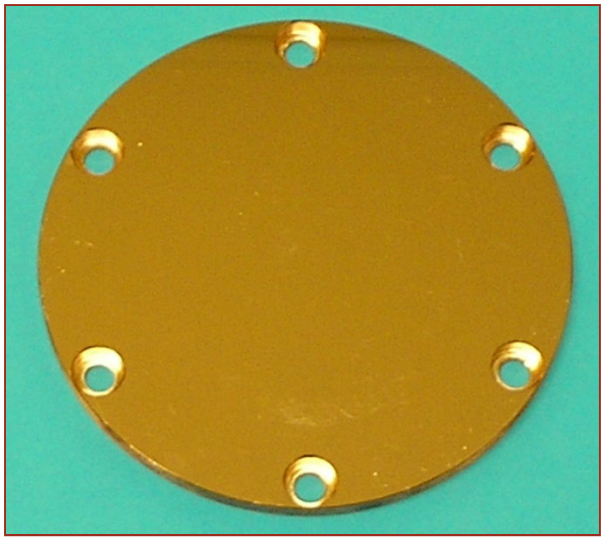
CuZr2-2: Sample Provided by CERN and Annealed at SLAC

T=110°C

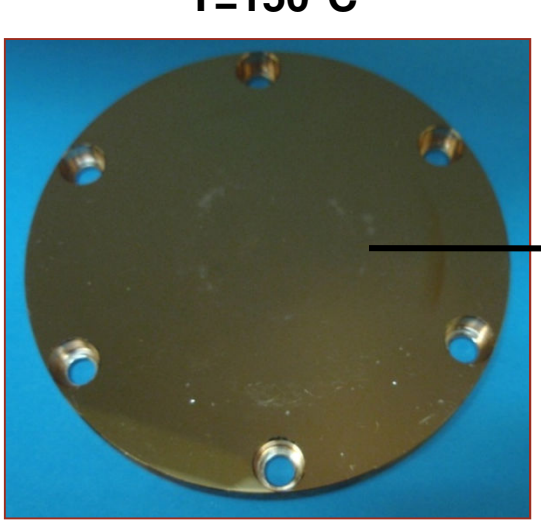


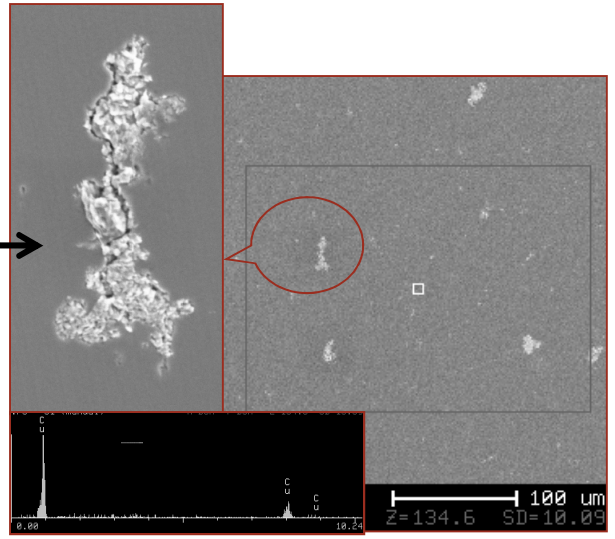
CuZr3-2 Cold Worked (CERN)

T=110°C

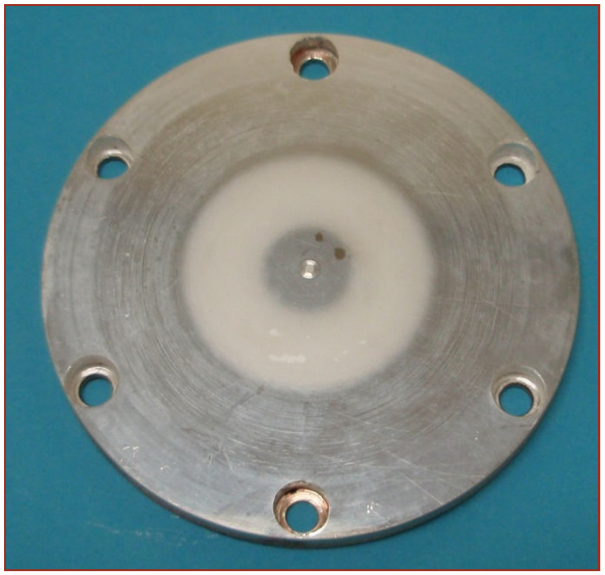


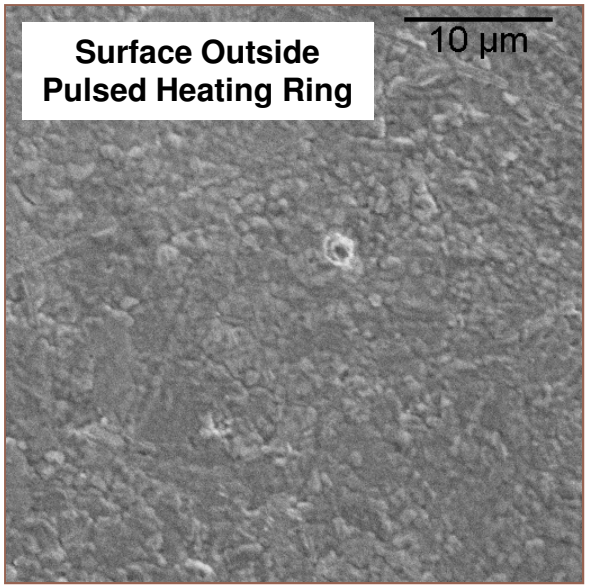
T=150°C

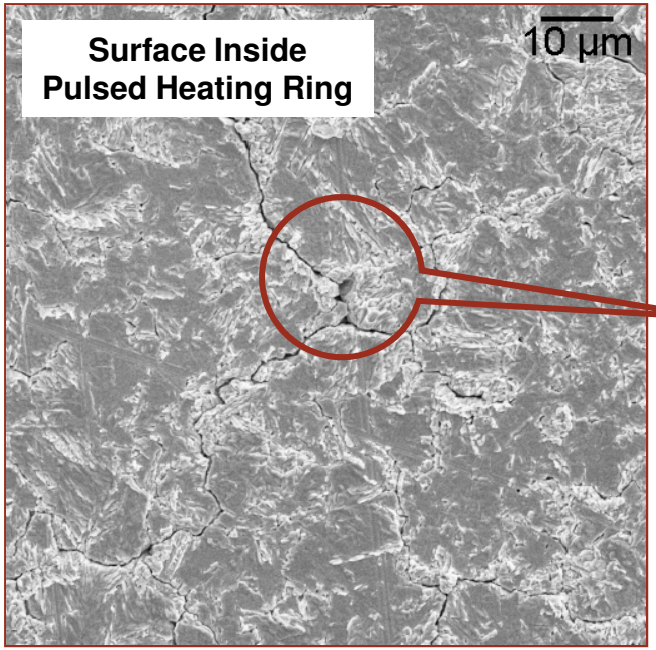


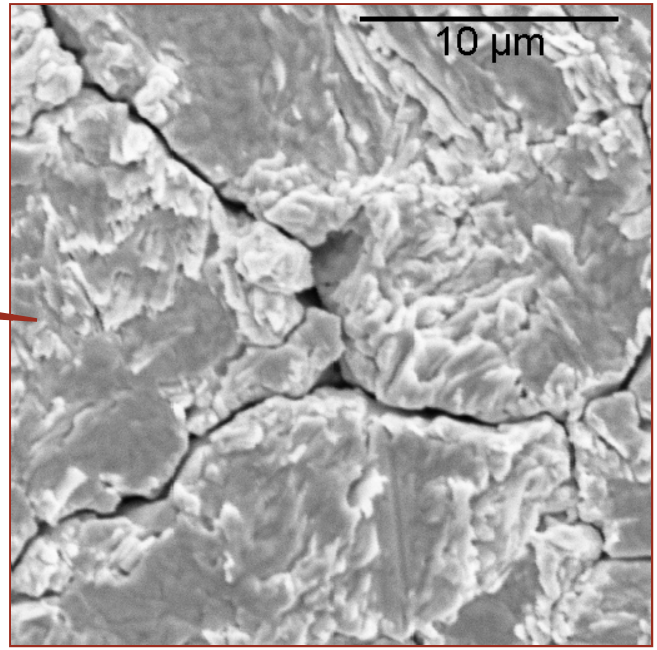


Silver Plated Copper (KEK): After RF Test (T=110°C)



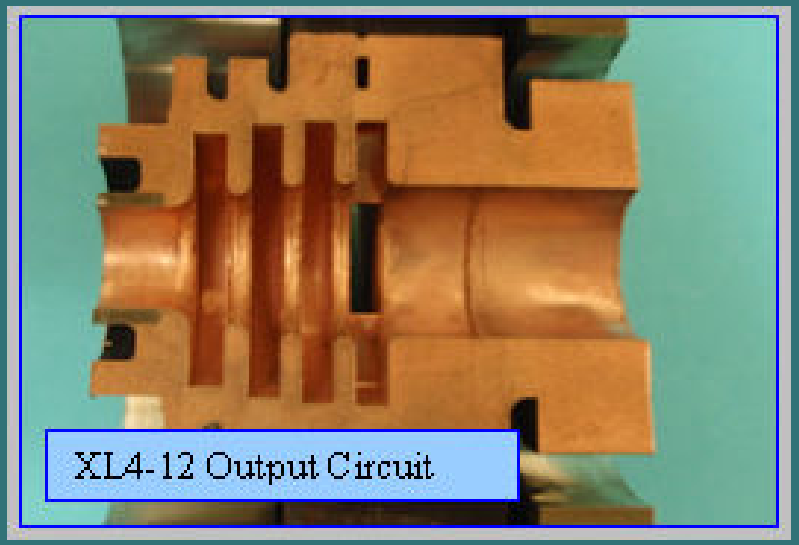




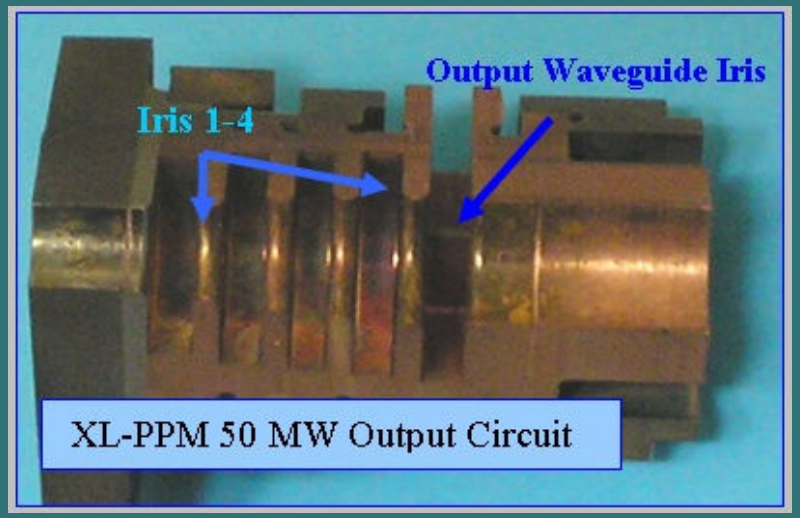


SLAC X-Band Klystron Output Circuits

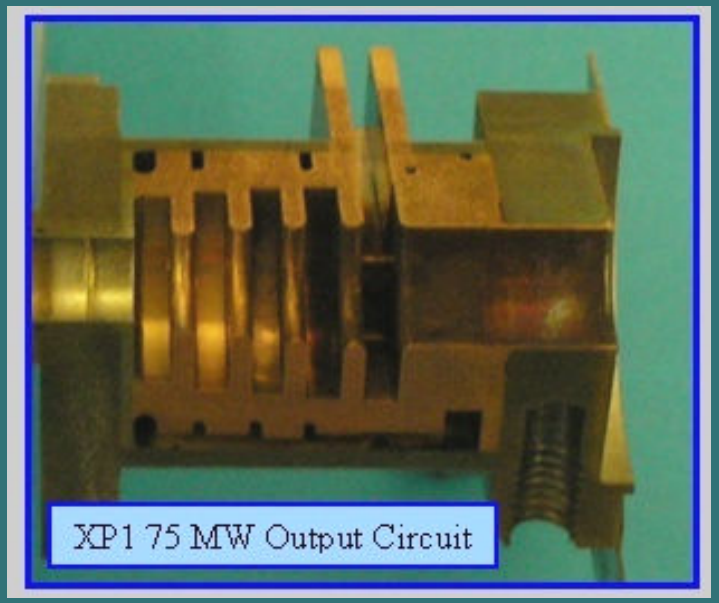
4-Cell (Solenoid)



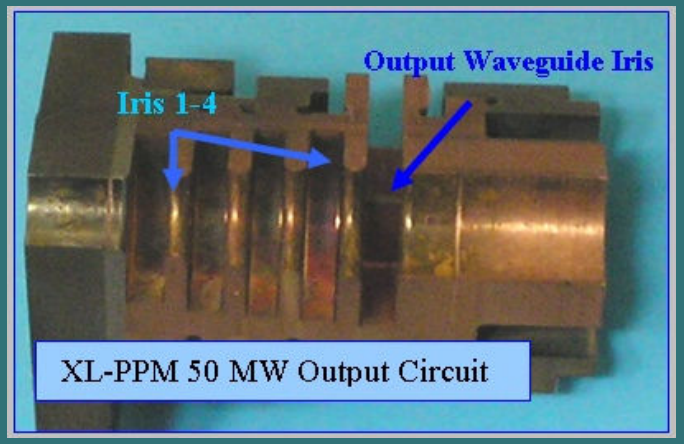
5-Cell (PPM)

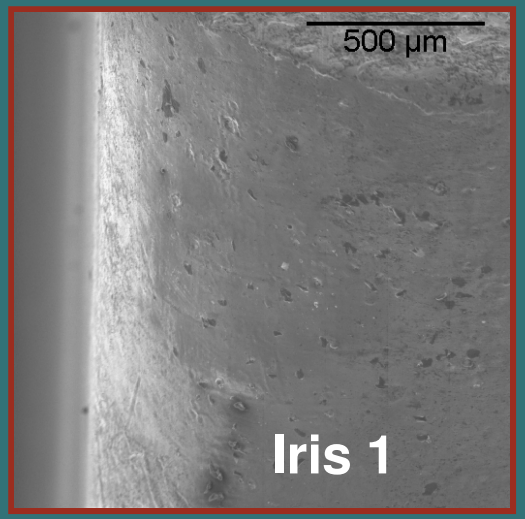


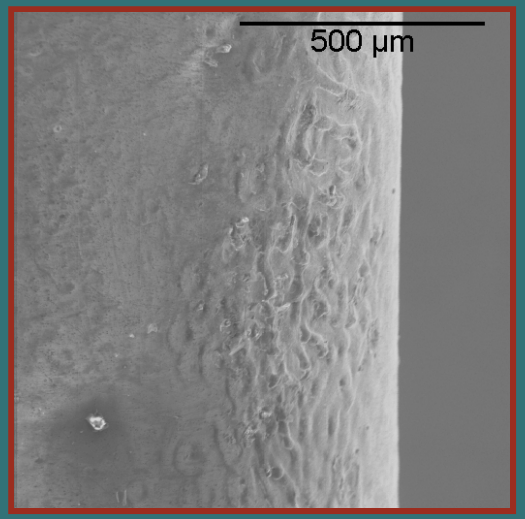
5-Cell (PPM)

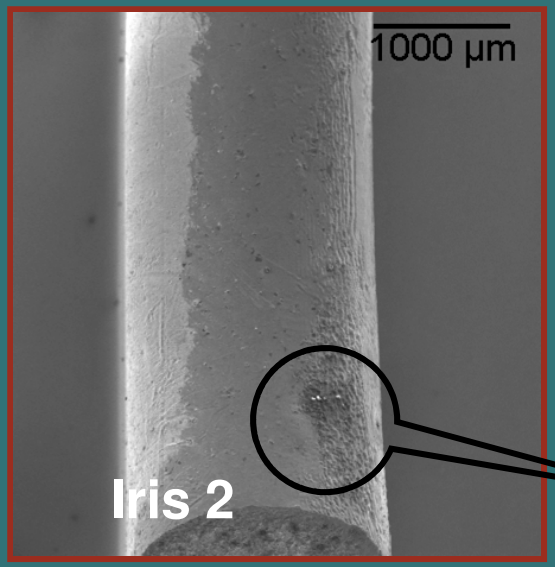


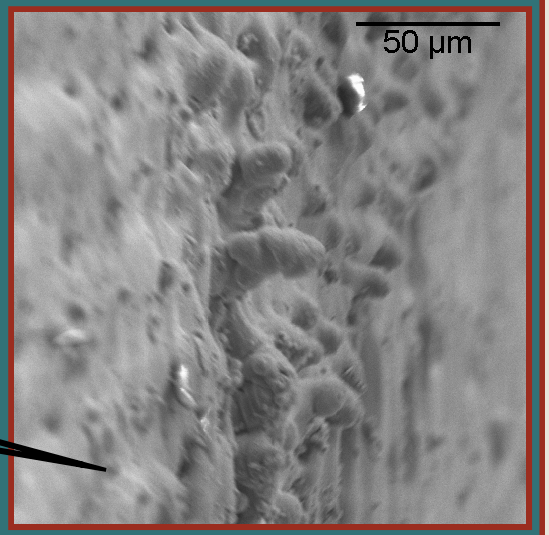
50 MW PPM Klystron: XL-PPM



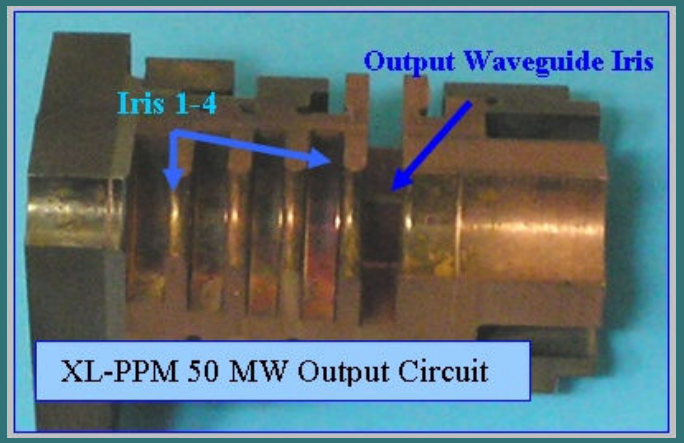


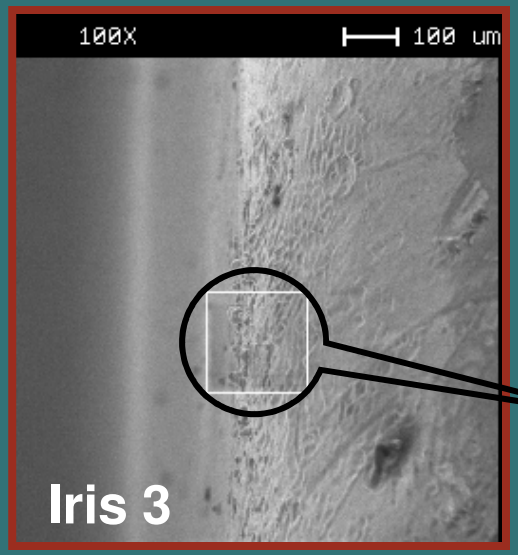


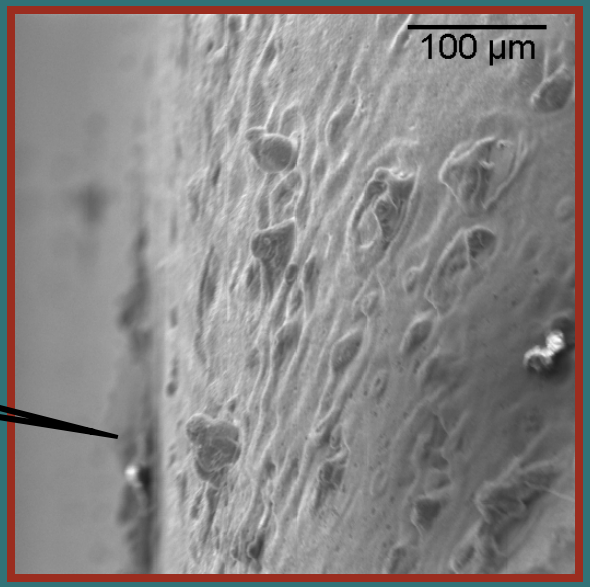


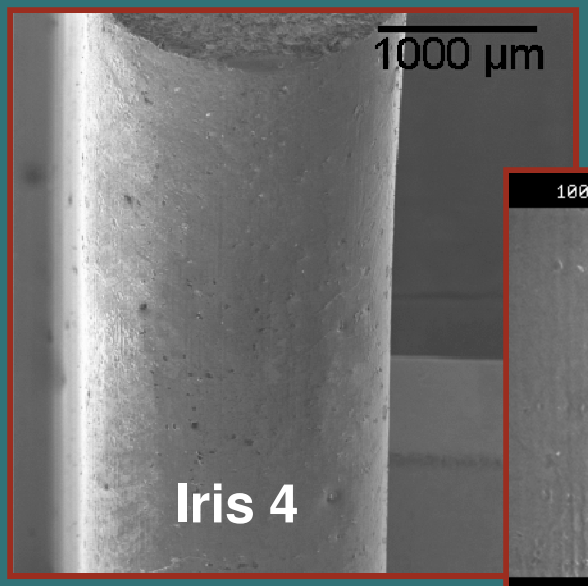


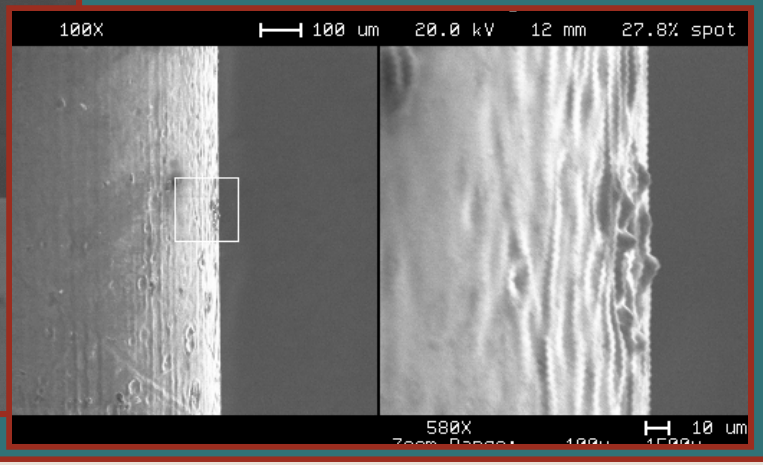
50 MW PPM Klystron: XL-PPM











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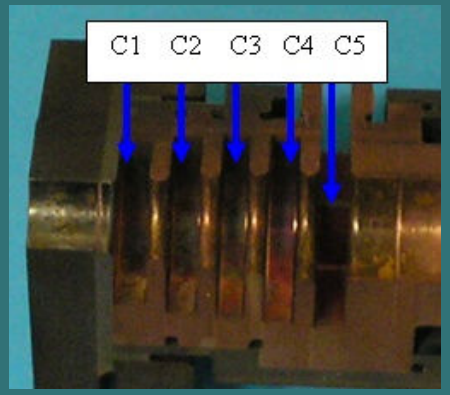
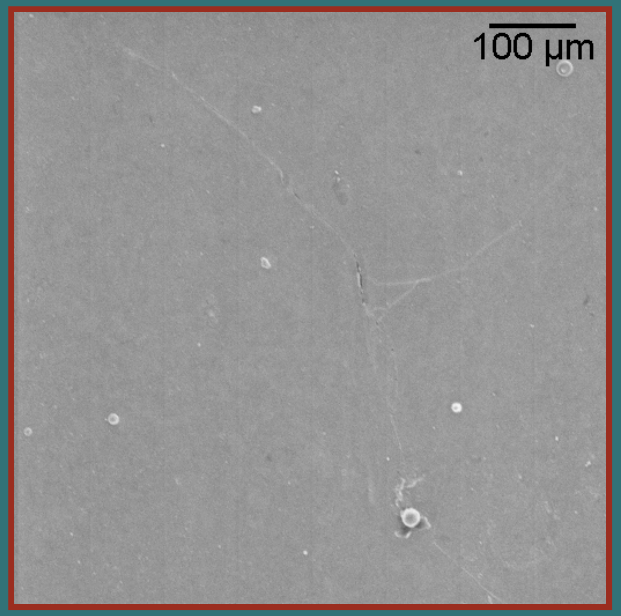


Cell 1



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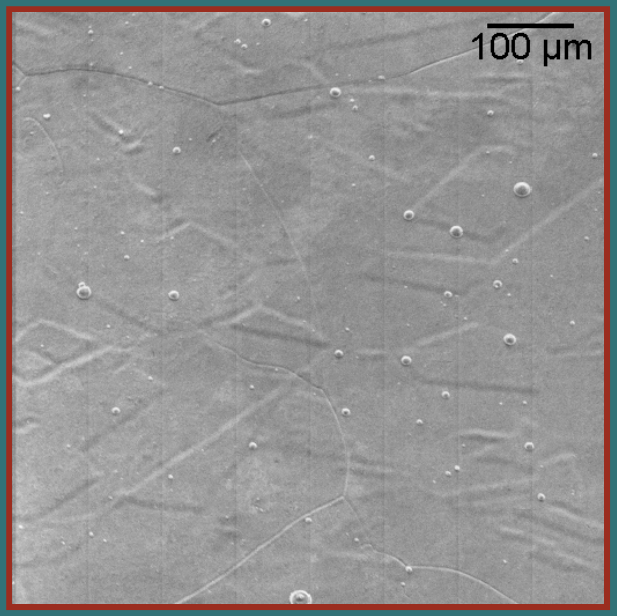

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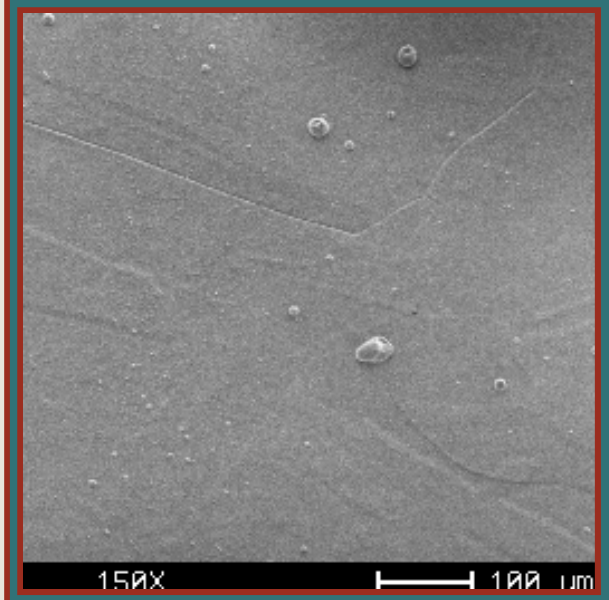

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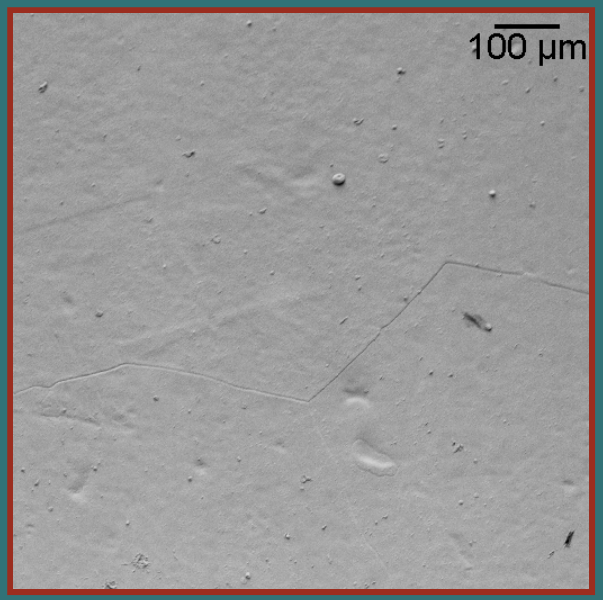

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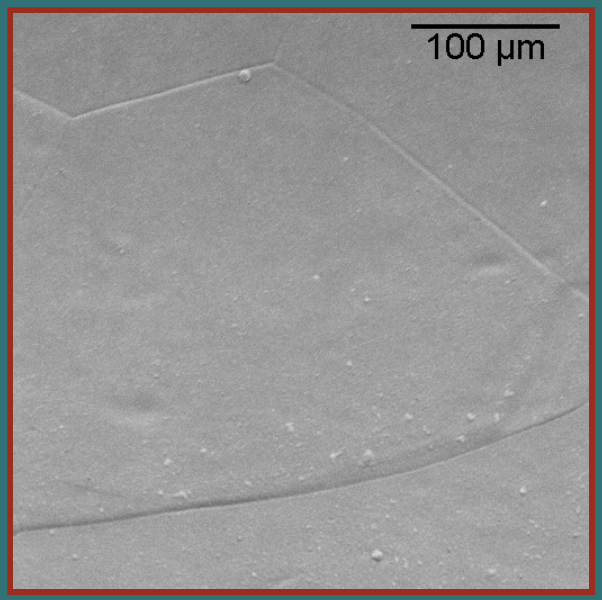
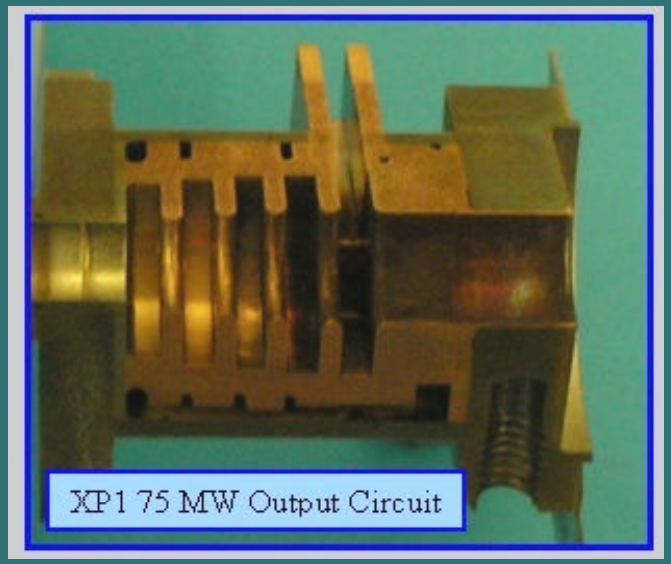
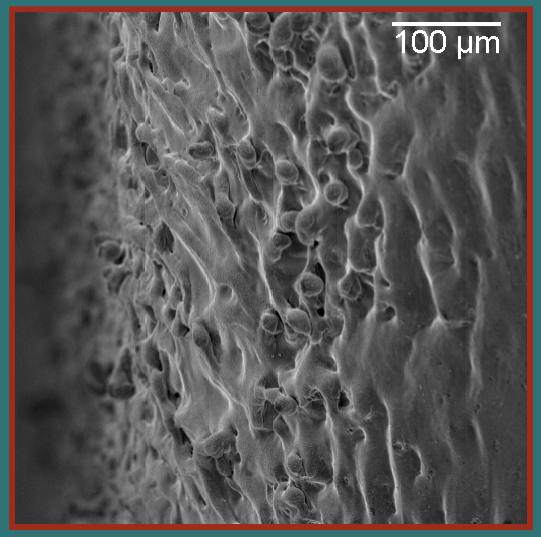
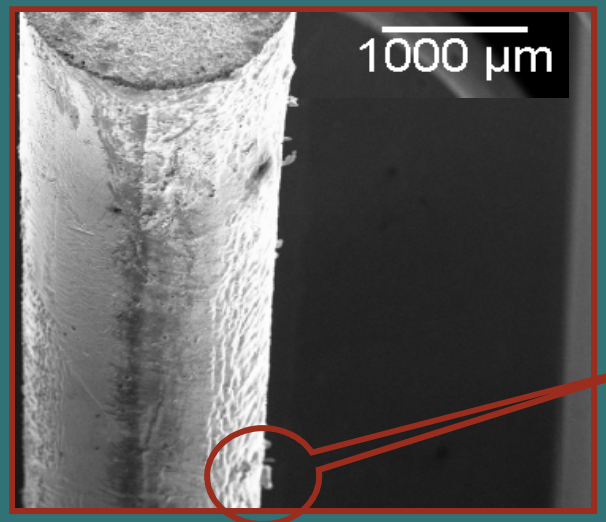


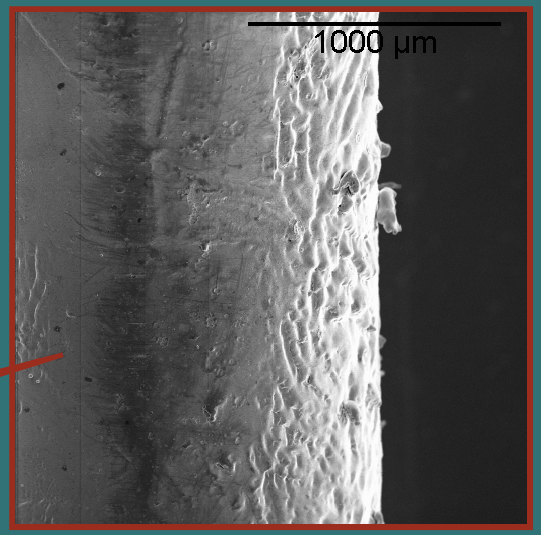
75 MW PPM Klystron: XP1



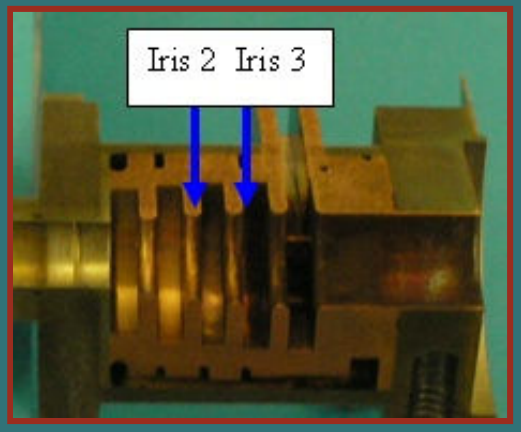
Iris 1

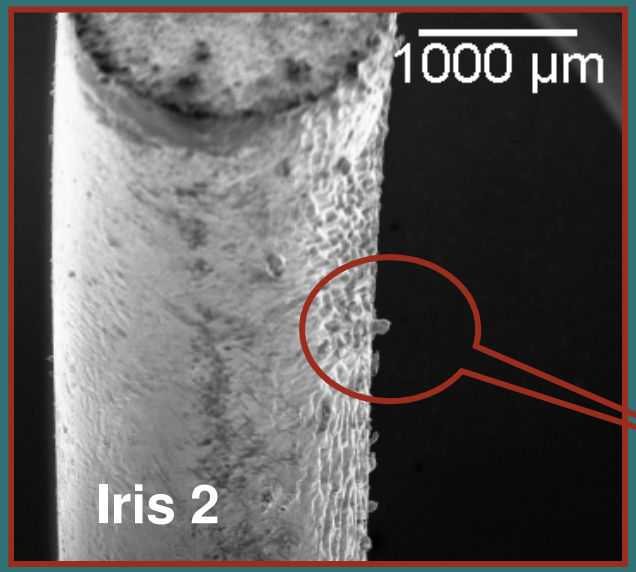


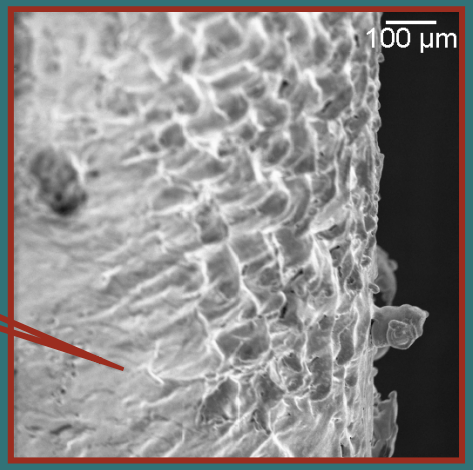


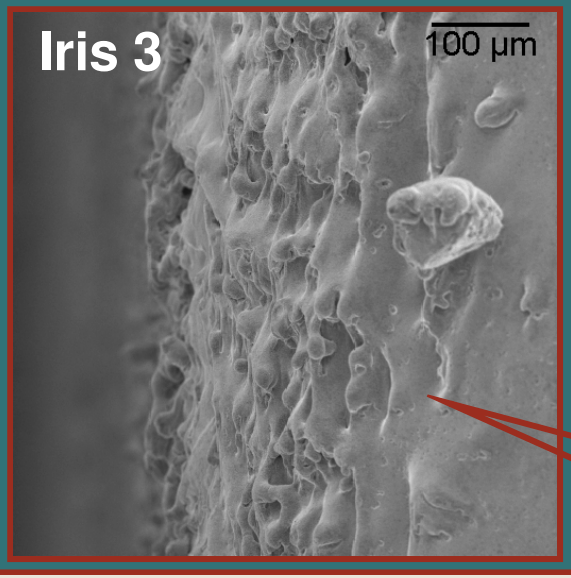


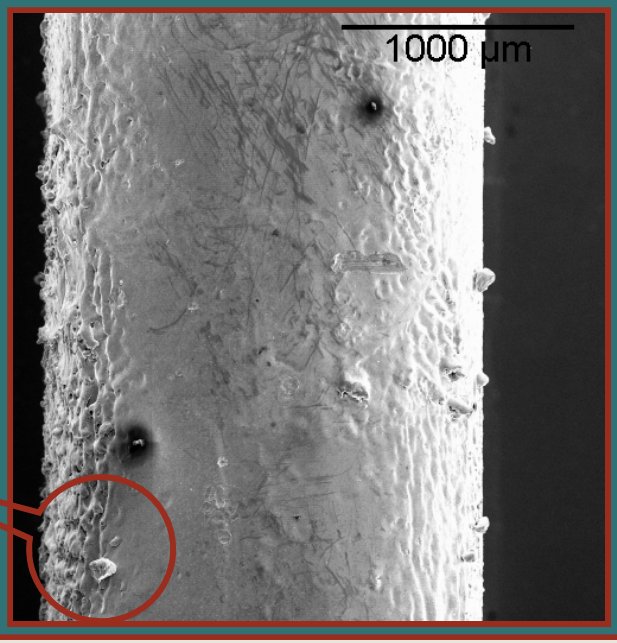
75 MW PPM Klystron: XP1











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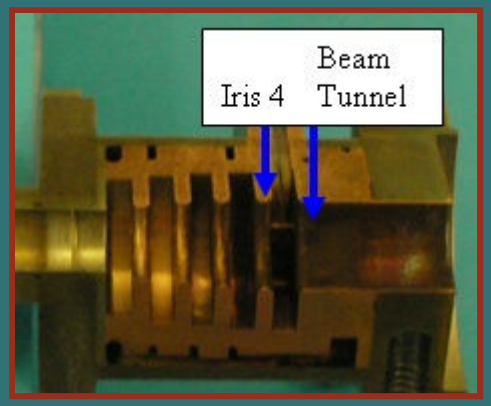
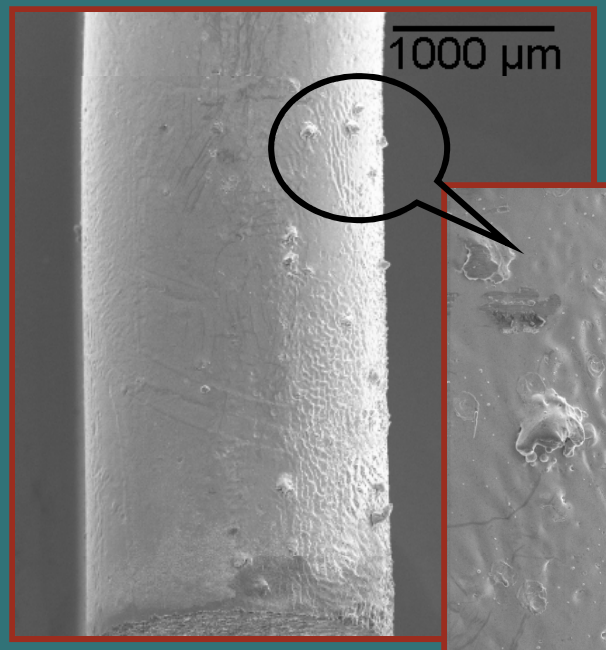
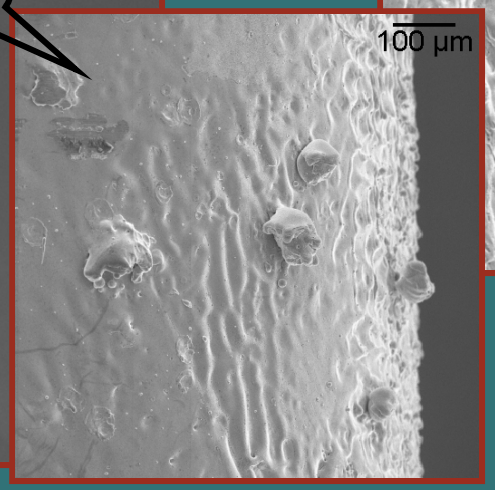
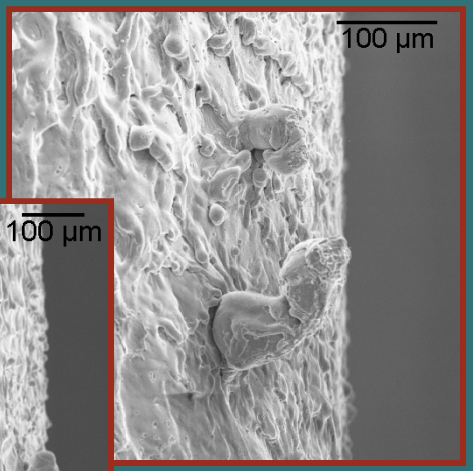


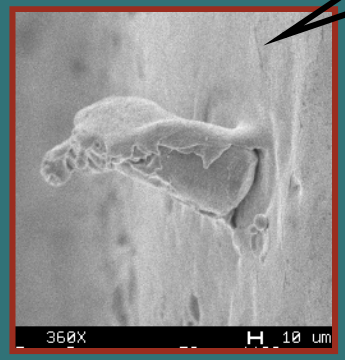
Iris 4

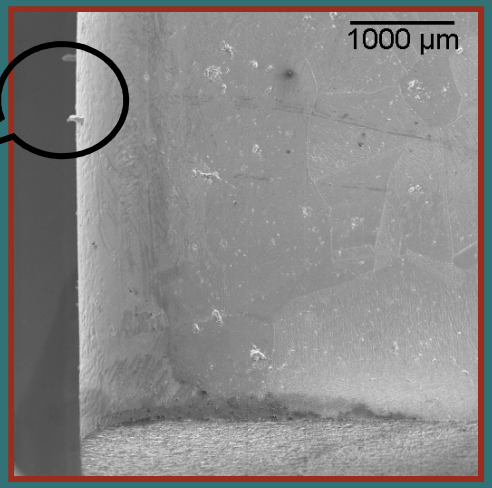


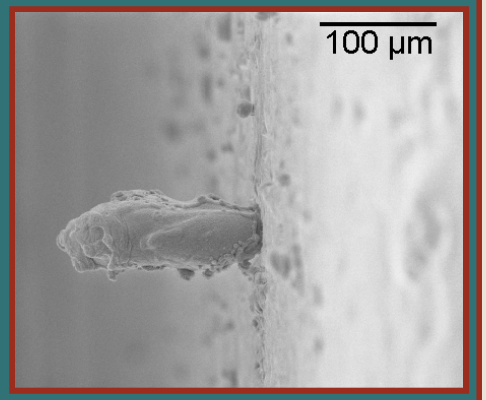




Beam Tunnel







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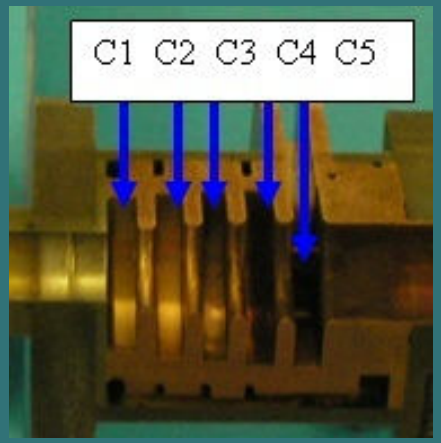
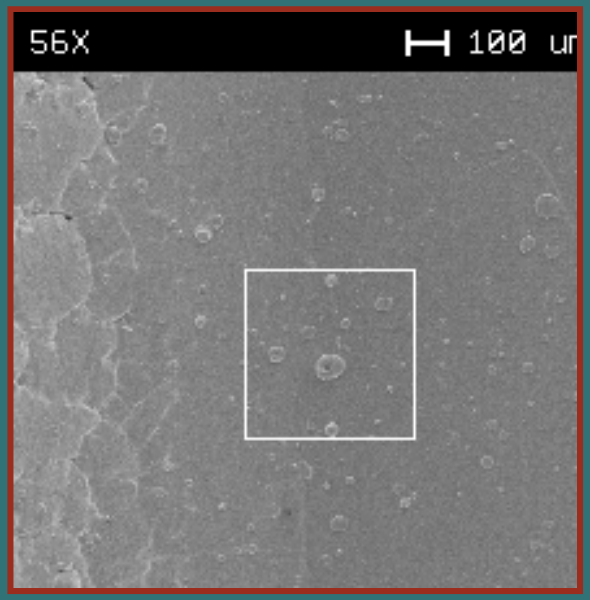


Cell 1



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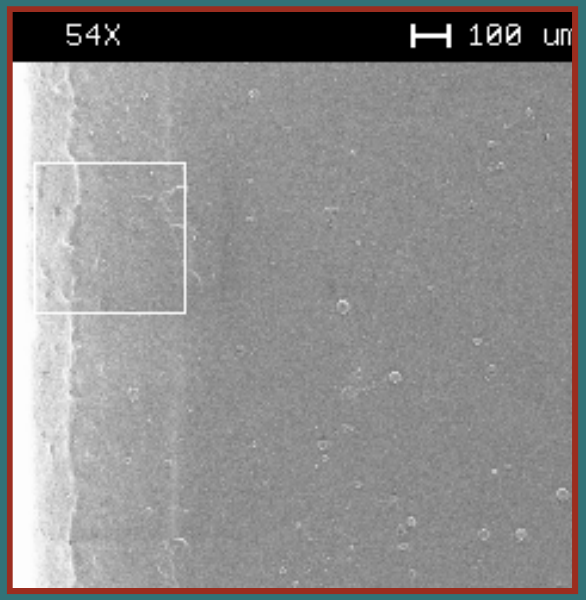

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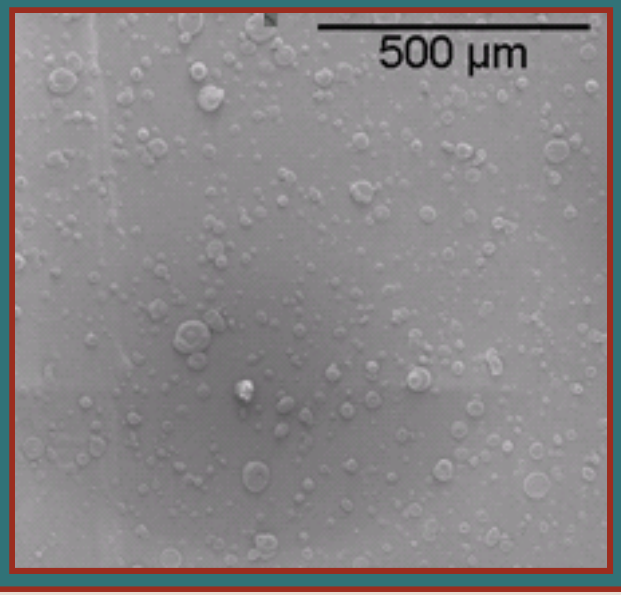

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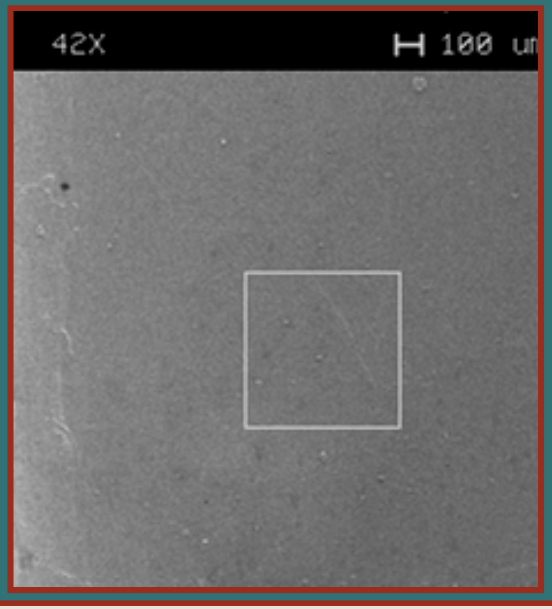

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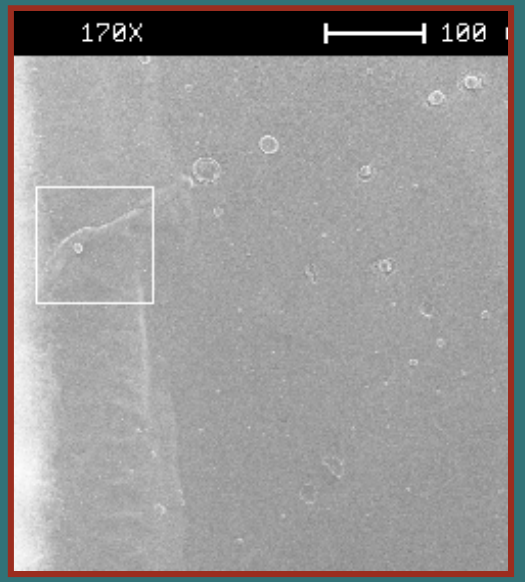
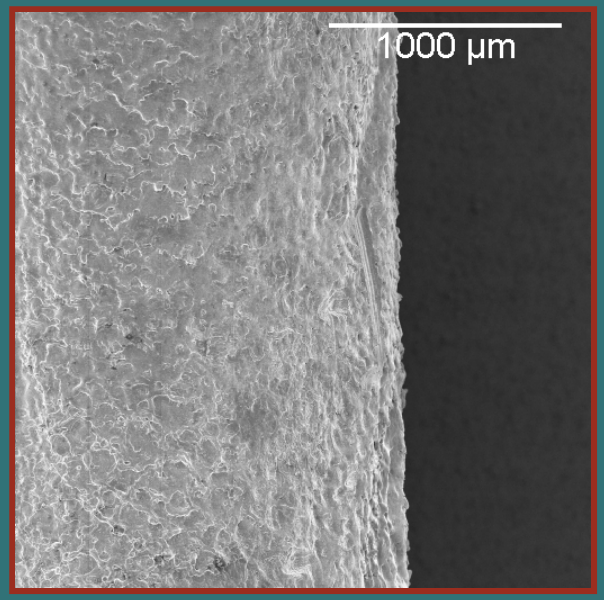
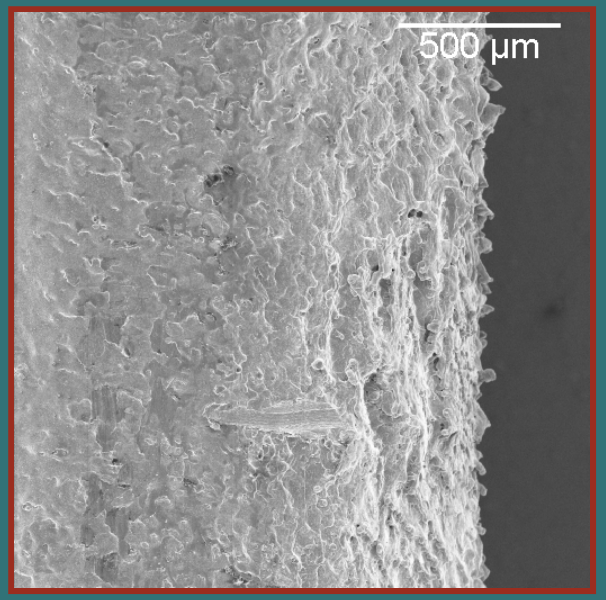


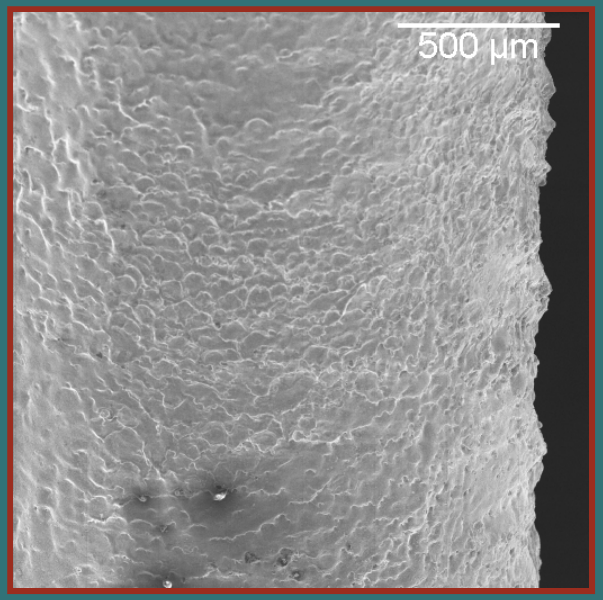
XL4-12



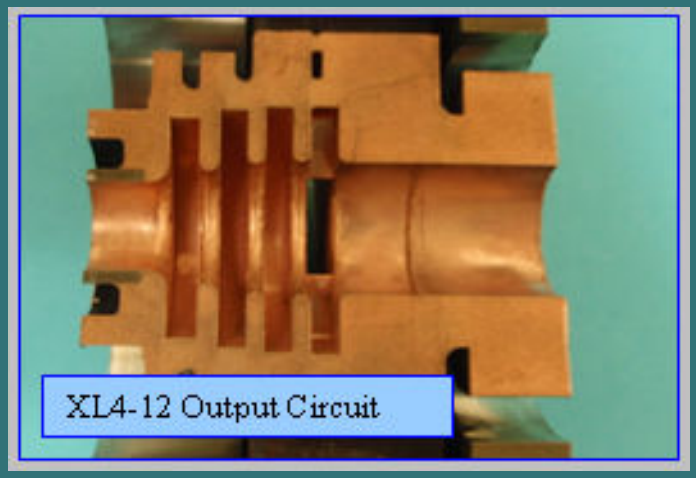
Iris 1

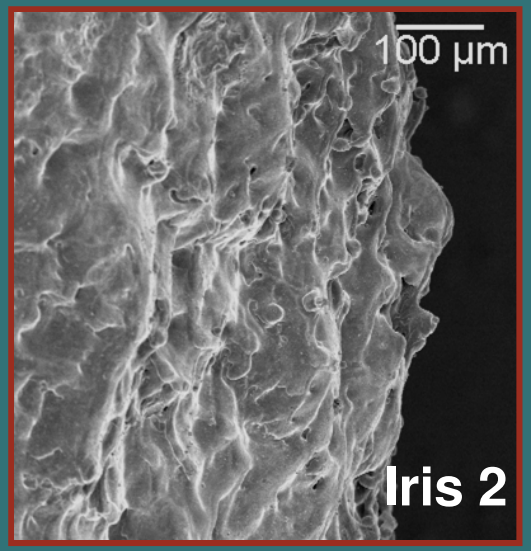


Iris 2



Iris 3

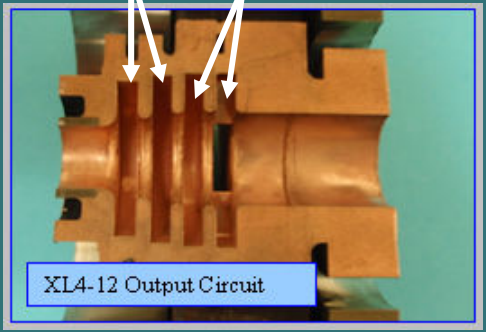




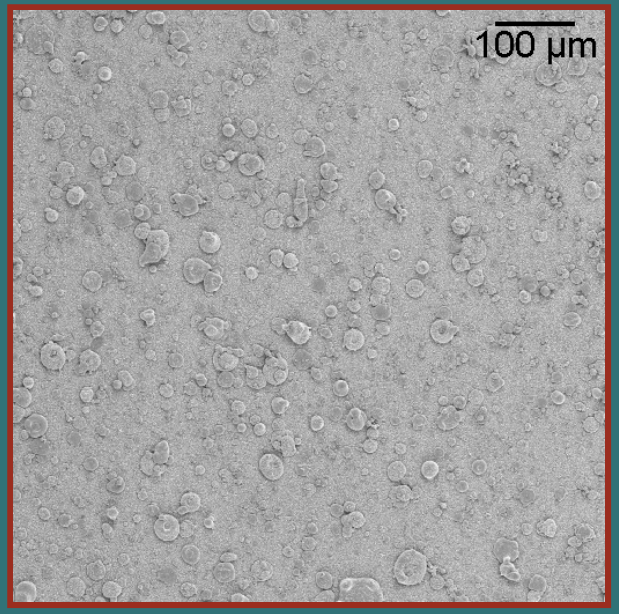
XL4-12

Cell 1, 2

Cell 3, 4



Cell 1



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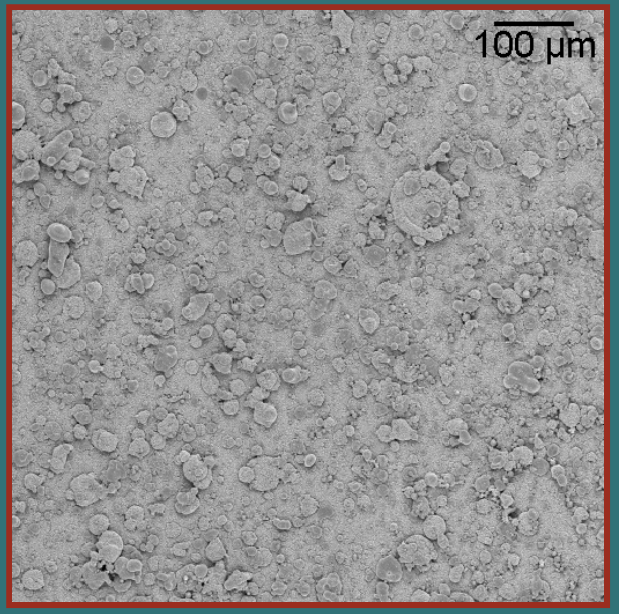

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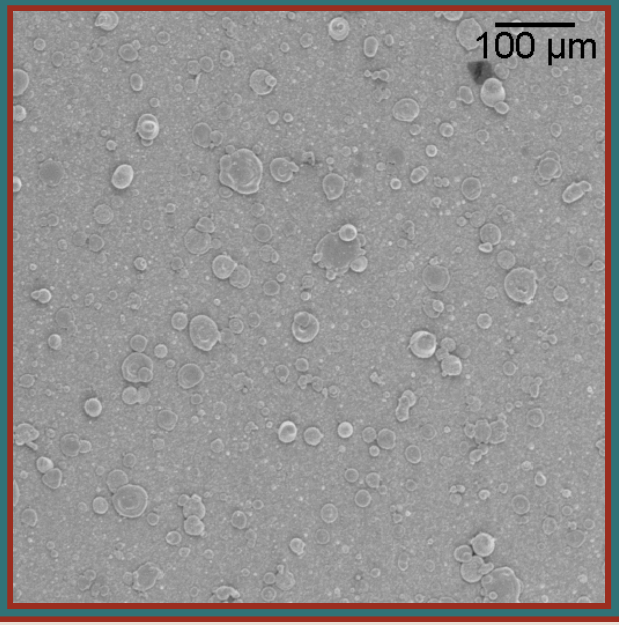

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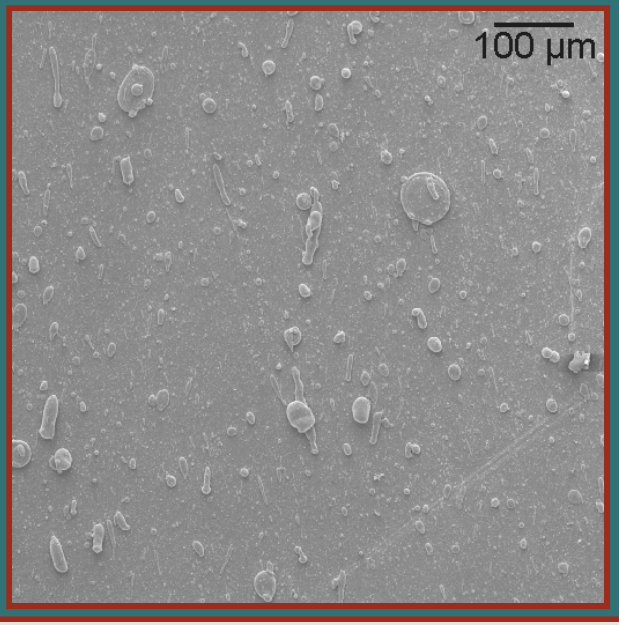
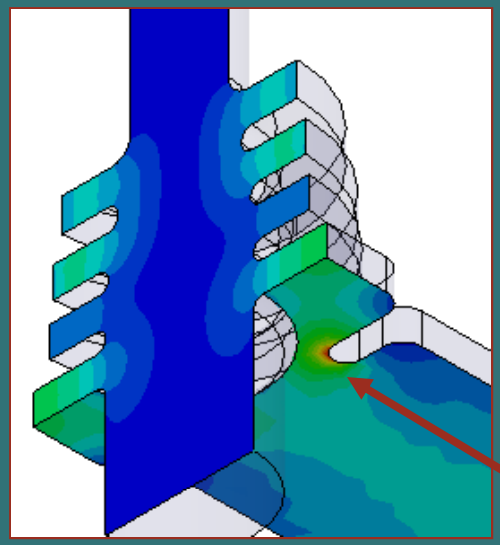
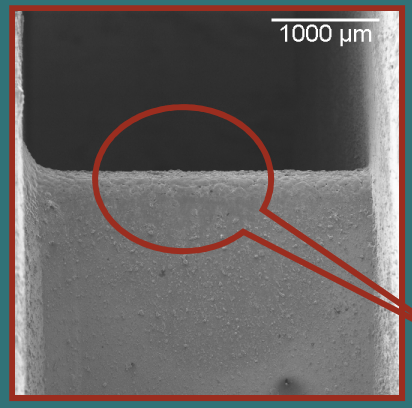


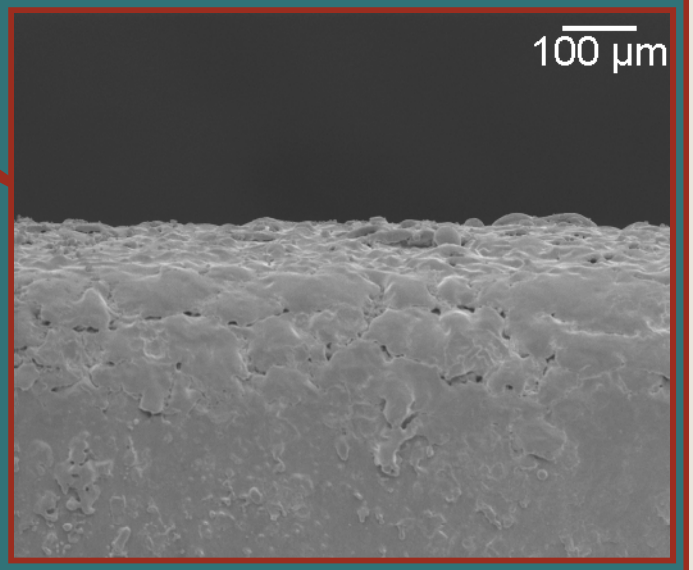
Output Waveguide Coupler Iris



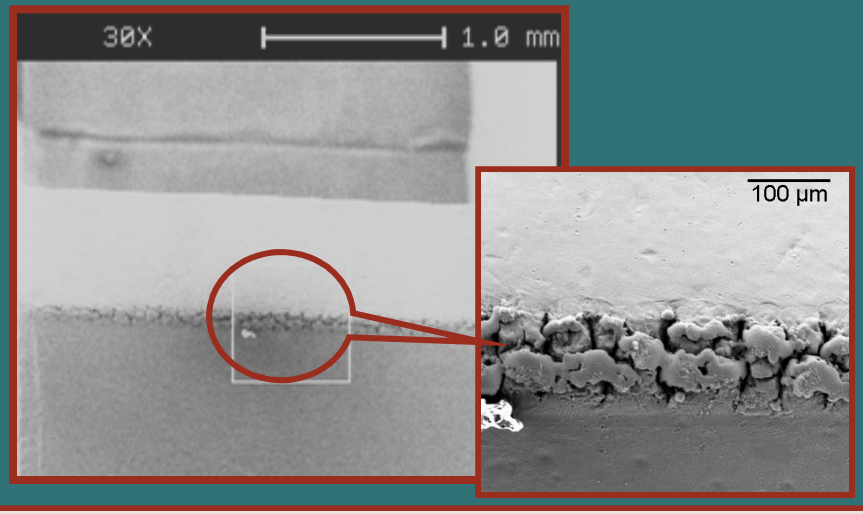
waveguide iris
XL5 = 4x XL4



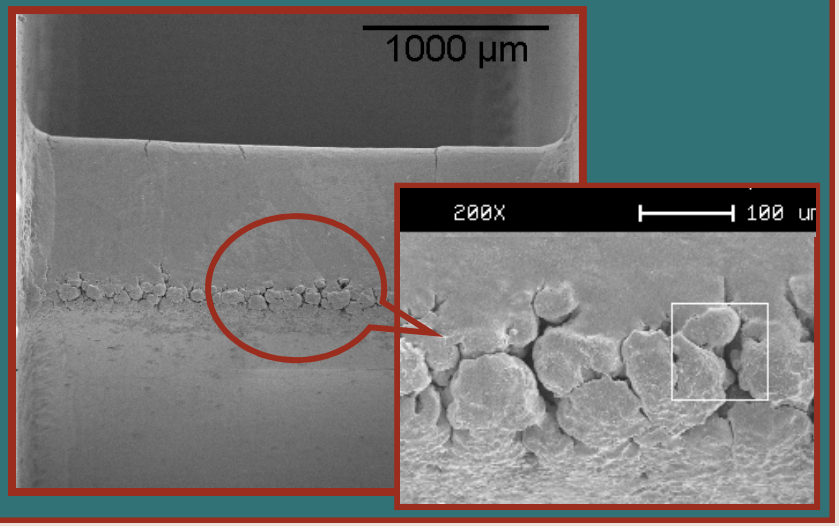
XL4-12



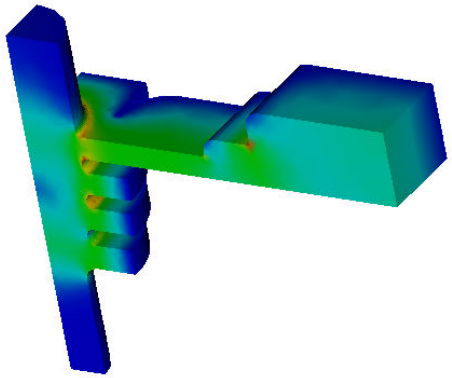
50 MW XL-PPM

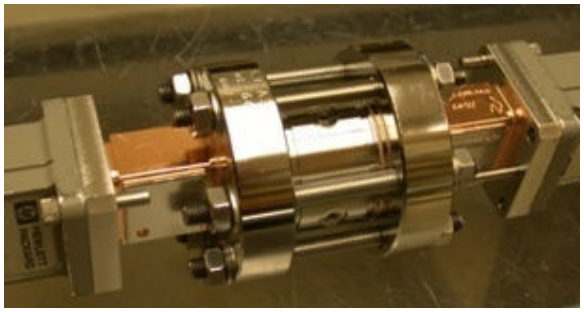


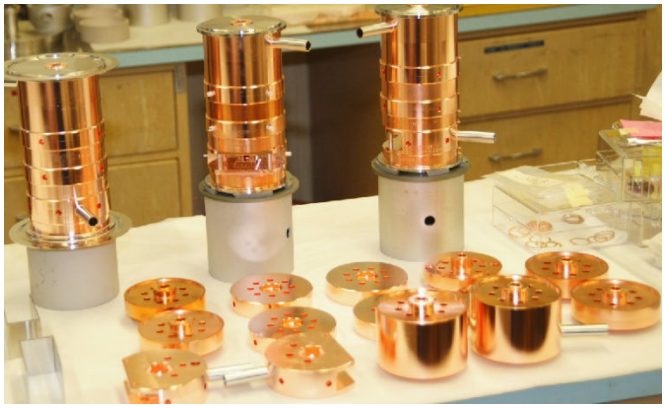
75 MW XP1

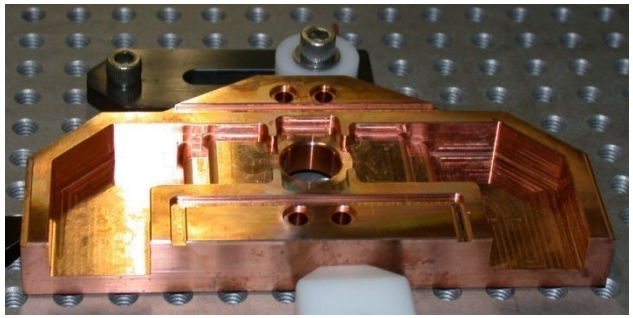


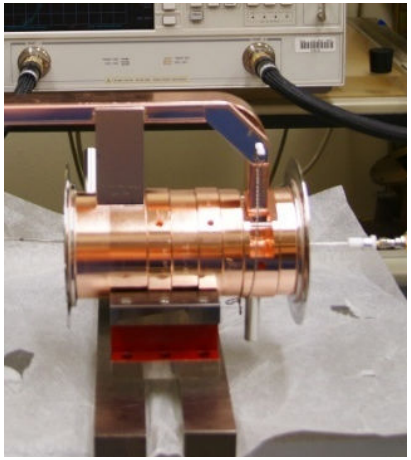
XL5 Status: **The design of the structure is complete. The impedance transformers, bends, combiner, mode converters and window are in fabrication**

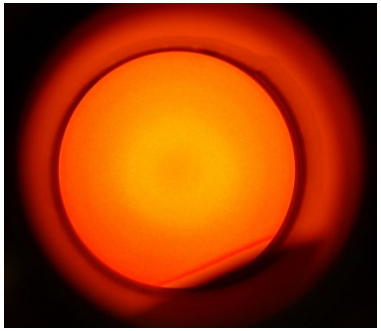






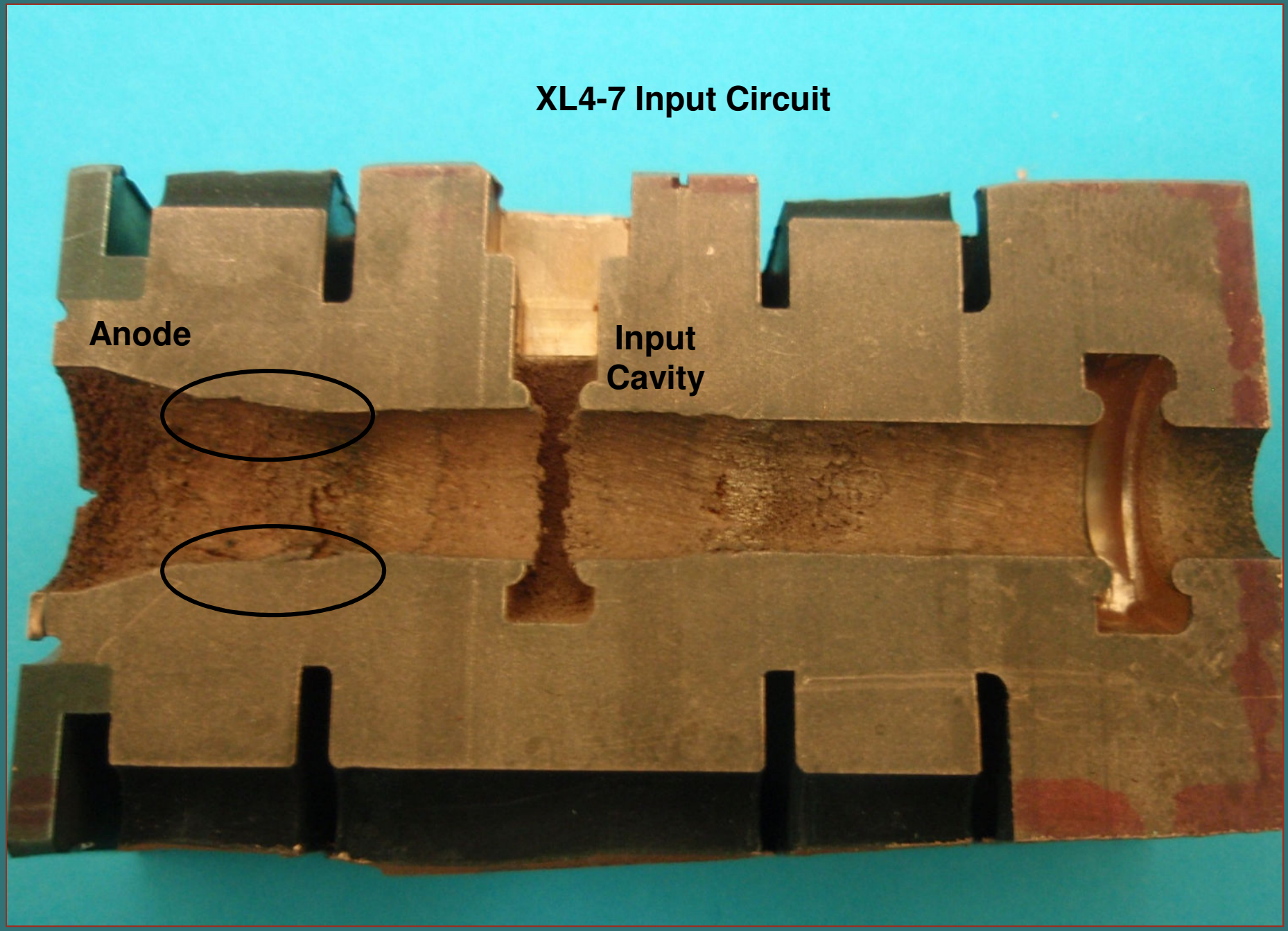




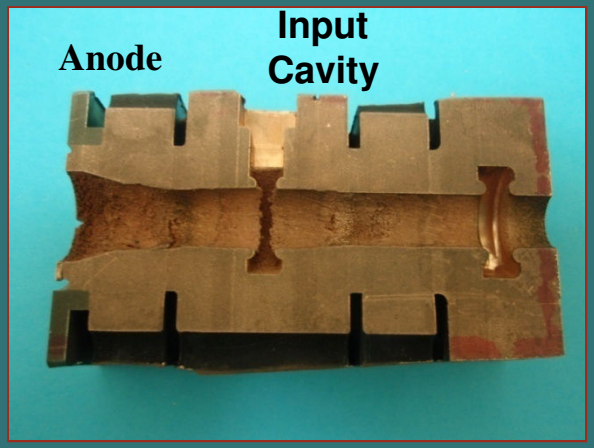


XL5 is scheduled to be shipped to CERN in February 2010

XL4-7 Input Circuit

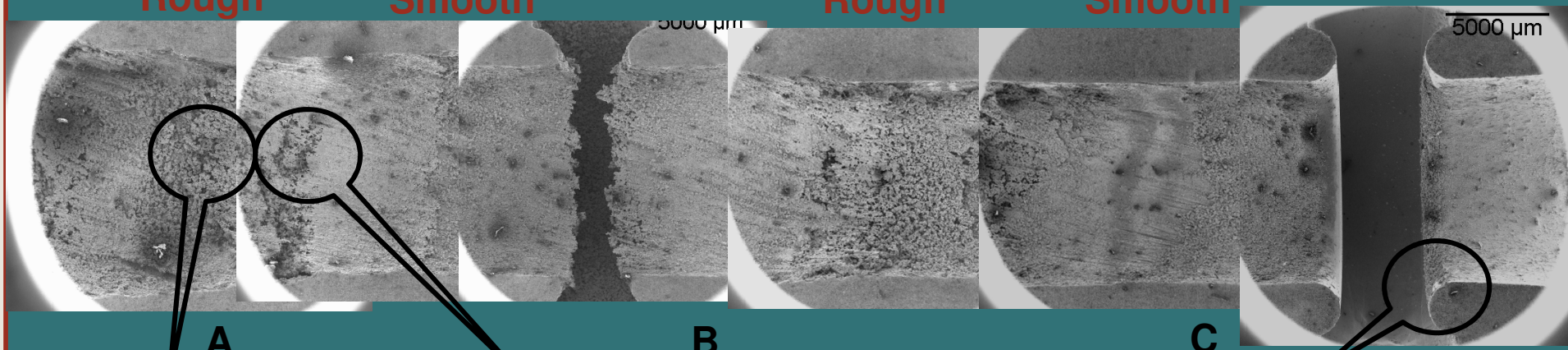


XL4-7 Input Circuit

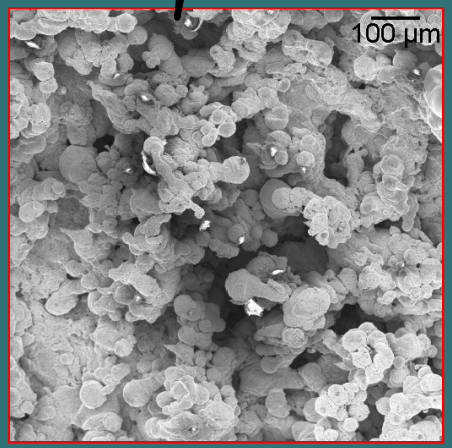


← Anode

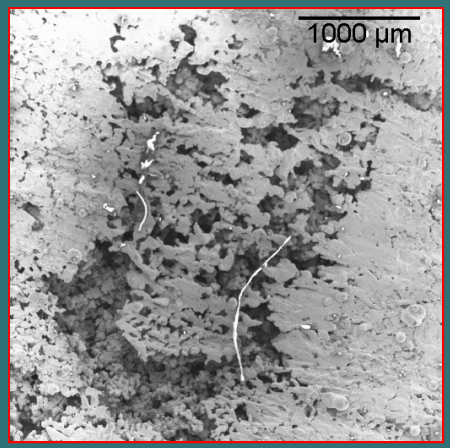
Rough Smooth Rough Smooth



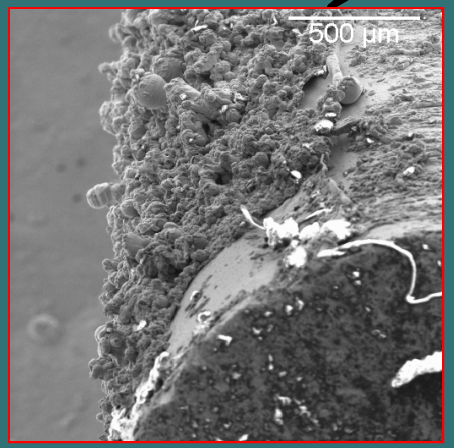
A



B



C



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