

# INVESTIGATION OF SAMPLES SEPARATED FROM PROTOTYPE CAVITIES OF THE EUROPEAN XFEL

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## *Abstract*

XFEL prototype cavities fabricated in industry and treated at DESY mainly meet the specification. Few cavities demonstrated low performance (13-20 MV/m) limited by thermal breakdown. The T-map analysis detected quench areas mainly close to the equator. Optical inspection by high resolution camera allowed tracking the several stages of preparation (as received, after the main electropolishing EP, after RF test) and in some cases makes possible monitoring the evolution of defects. In order to understand the nature of reduced performance and get more detailed information on the origin of defects, some samples have been extracted from four cavities and investigated by light microscope, 3D-microscope, SEM, EDX and Auger spectroscopy. Several surface flaws with sizes from a few  $\mu\text{m}$  to hundreds of  $\mu\text{m}$  have been detected. The defects can be grouped in four categories. The first category of defects indicates foreign elements (often with increased content of carbon). Deviation from smooth surface profile characterizes the second type of defects (holes, bumps). Damaged surface areas at high pressure water rinsing and etching pits belong to the third and fourth category of defects.

**CONTRIBUTION NOT  
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