

XR 50 X-ray Source With Boron Nitride Anode

Application Notes

XR 50

In the standard configuration the XR 50 is equipped with two filaments, each of which generates a half-moon shaped irradiation pattern on the anode. Fig. 1 shows a electron optical simulation (SIMION) of the foci of both filaments on the anode surface. The maximum total power in each focus is 600 W; the anode voltage can be up to 15 kV. Fig. 2 shows a 3-D drawing of the anode end-piece. The anode surfaces from which the x-rays are emitted are inclined by 22°.

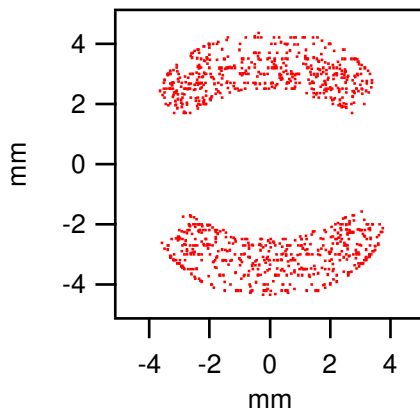


Fig. 1: front view onto anode end-piece showing the irradiation pattern

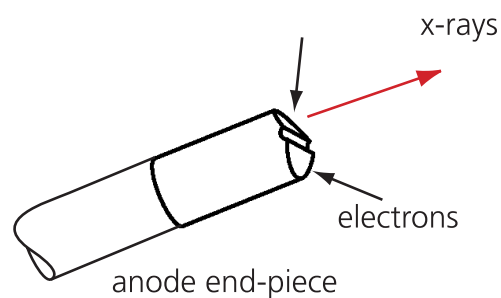


Fig. 2: geometry of the anode end piece

XR 50 fine focus

We are currently testing a fine focus option for the XR 50 source. This allows to either generate a large focus, similar to the standard XR 50, or a small line focus. Fig. 3 shows an electron optical simulation (SIMION) of the unfocussed beam (left) and the focussed beam (right). When unfocussed, the source can be irradiated with a power of 600 W; when focussed, the total power has to be reduced, but the power density is significantly higher than in the unfocussed case. The shape of the focus can be adapted to the applications needs within certain limitations, e.g. it is also possible to generate a point focus. The anode end-piece is flat (as compared to the 22° inclined shape of the XR 50).

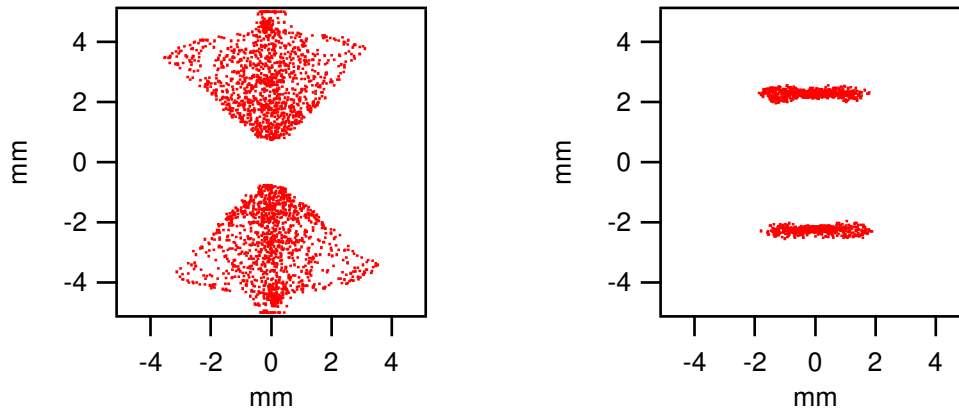


Fig. 3: irradiation patterns on the anode of the XR 50 fine focus (both filaments switched on). Left: unfocussed; right: focussed.

Coating Of The Anode End Piece

The end-piece of the anode in the XR 50 source is typically coated with aluminium for one filament and magnesium for the other. We think that it would be best to simply replace this coating by a boron nitride/titanium diboride film. The end piece is made of high purity silver. The coating has to be done as the last production step. That means that either the complete anode has to fit into the coating apparatus or an adapter flange has to be used. The anode is essentially a 10 mm diameter tube mounted on a CF40 flange. It has an overall length of 515.7 mm. In our coating apparatus we use KF flanges that clamp around the 10 mm anode tube such that only 100 mm of the tube are insight the coating chamber.

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