

Supporting information

Experimental

SI-1:

Test structure vs. beam profile

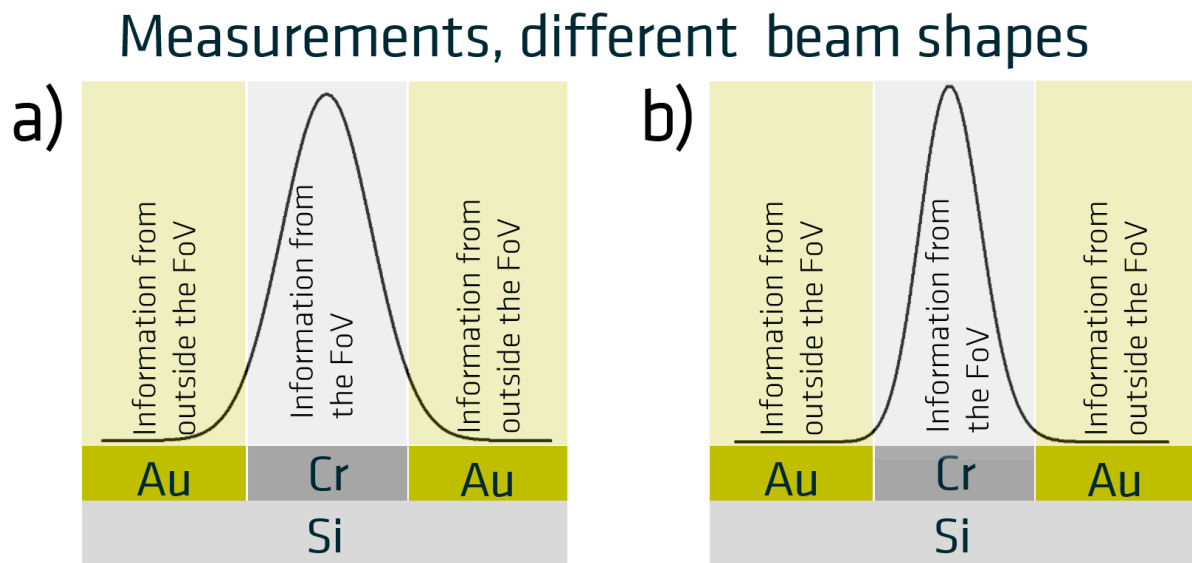


Figure S1: Different X-ray beam shapes, wider a) and narrower b), led to slightly different measured Cr/Au intensity ratios.

SI-2:

Correct z-alignment

The instrument manufacturer Kratos recommends a height confirmation for all DLD systems. Once the sample has been positioned at the analysis point, the analysis height can be confirmed by recording FoV2 images at a series of heights. As a starting point, $\pm 150 \mu\text{m}$ from the initial position with step sizes of $30 \mu\text{m}$ is utilized. After applying these increments, in the instrument manager of the software, a flow chart for an automatic record of the images is set up. After the recording, the images are reviewed and the image with the best focus is selected. This is the optimized analysis position and this position is set to the sample.

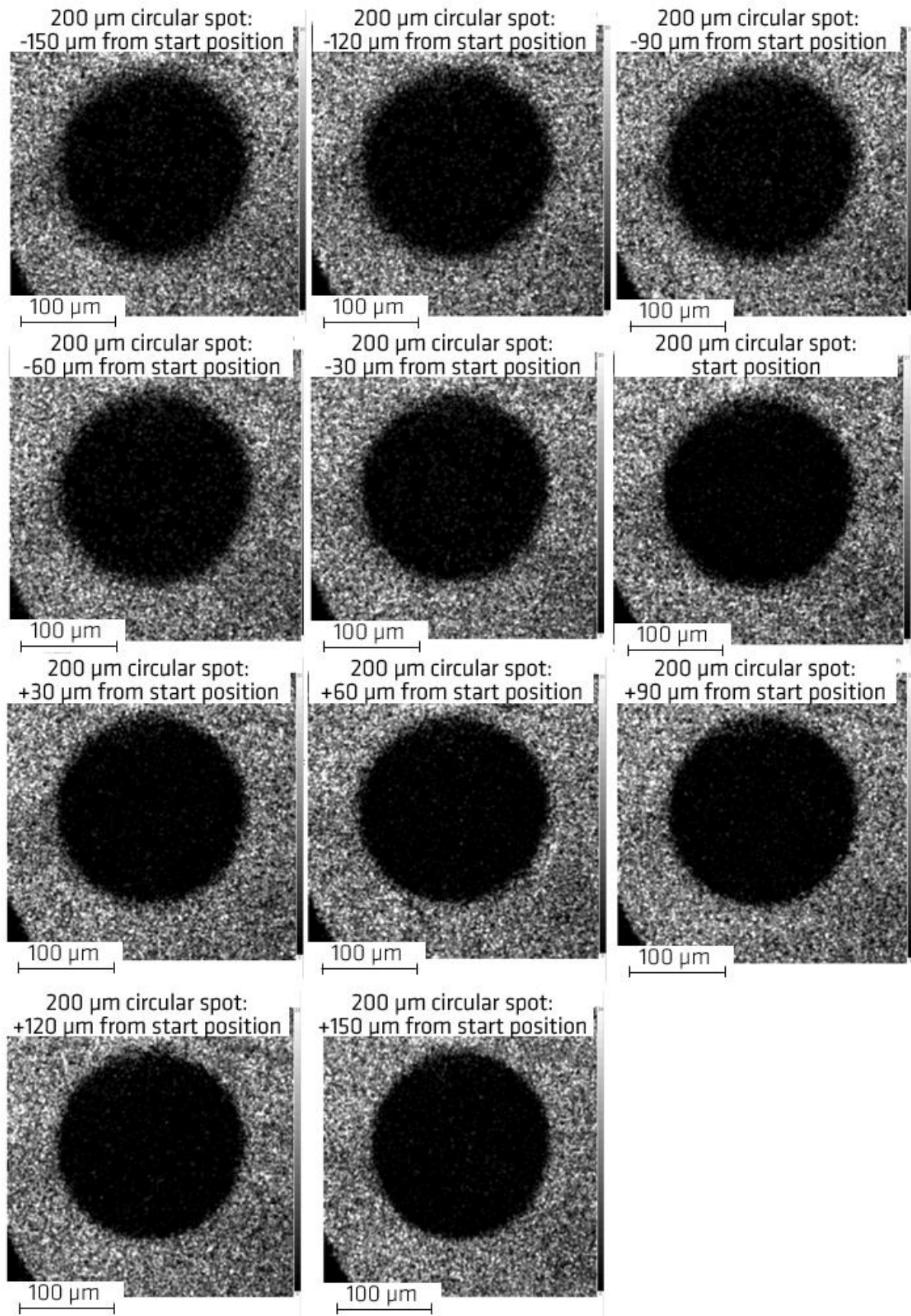


Figure S2: 200 μm circular spot at different height positions during the z-alignment. Position +120 μm has the correct focus.

Results and discussion

SI-3:

SEM

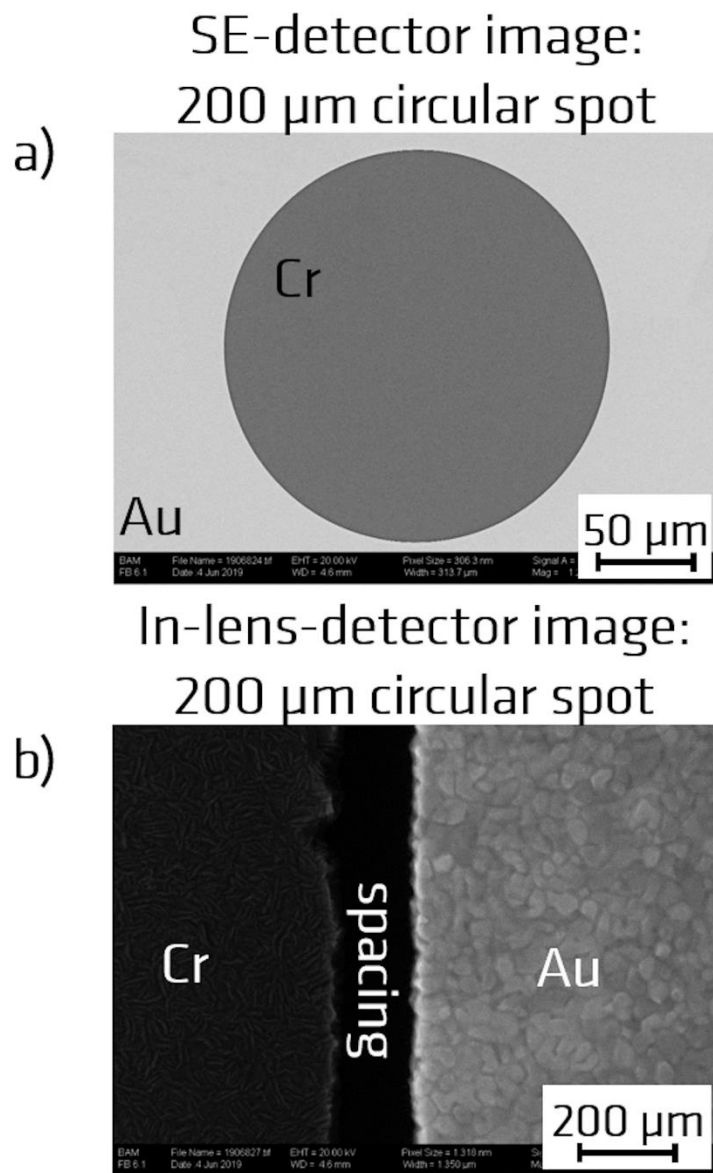


Figure S3: a) Secondary-Electron detector images of the test structures and b) in-lens detector images for characterization of the spacing between the Au-film edge and the Cr-structure.

SI-4:

Profilometry

Cr circular spots were only found for diameters from 200 μm down to 10 μm . The Cr circular spot of 5 μm diameter cannot be visualized and detected with the Dektak XT profiler. The device reveals that there are craters. The difference in height h between the Au-film and the Cr circular spots is on average below the required 50 nm, see table S1. On earlier test samples the Cr spots were on top of the Au surface. Consequently, the height difference was larger than 50 nm, which caused a problem for the correct z-alignment with the Kratos AXIS Ultra DLD instrument.

Table S1: Measured depth (height difference between Cr and Au-film) values for Cr circular spots /with device measurement uncertainties).

Nominal Cr circular spots / μm	Depth / nm
200	23.2 ± 2.0
100	24.2 ± 2.0
50	22.2 ± 2.0
25	25.5 ± 2.0
10	23.3 ± 2.0
5	n. a.