

	<b>Experiment title:</b>	<b>Experiment number:</b> ME-1374
<b>Beamline:</b> ID13	<b>Date of experiment:</b> from: 08/11/2014      to: 11/11/2014	<b>Date of report:</b> 27/02/2015  <i>Received at ESRF:</i>
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**Report:**

The purpose of this experiment was the determination of single-crystallinity of artificially grown eutectic gold structure which possesses very high (sub- $\mu\text{m}$ ) curvatures throughout its entirety. The sample was a slice of such structure, thinned down by FIB. It was mounted on an edge of a TEM grid, and can be seen in figure 1.

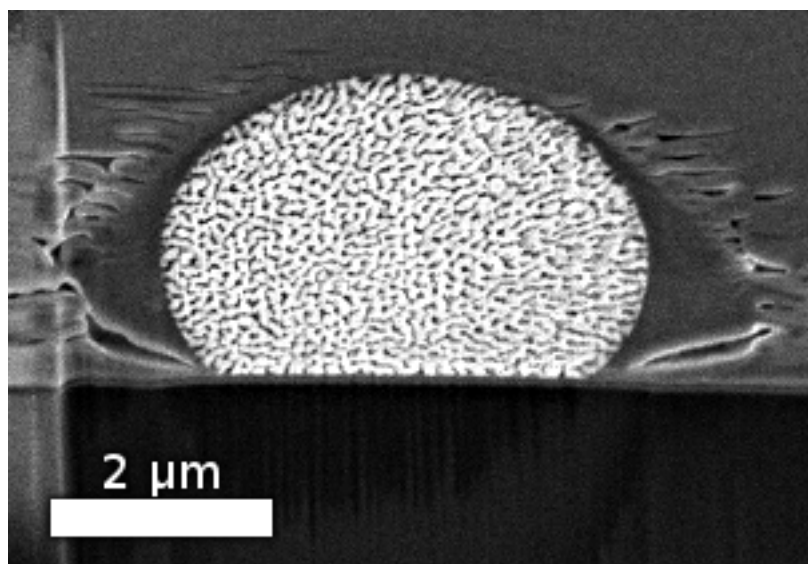


Figure 1: SEM micrograph of the sample.

The sample was scanned with nano-focused X-ray beam at different rotation angles. The diffractions from all the spots on the sample and the different rotations were analyzed, and rocking curves were prepared for reflections of different crystallographic planes.

An example for the  $\{200\}$  planes of gold can be seen in figures 2 and 3. Such analyses were performed for other planes as well, with similar results. Also, it was demonstrated that the major diffraction spots keep their azimuthal and radial positions over the entire area of the sample.

Based on this data, it could be concluded that this structure, despite the very high curvatures typical to it, and the complete lack of crystalline facets, exhibits similar orientation all over. Single crystals with such curvature and lack of facets were observed in biological systems before, but so far it was impossible to manufacture them artificially.

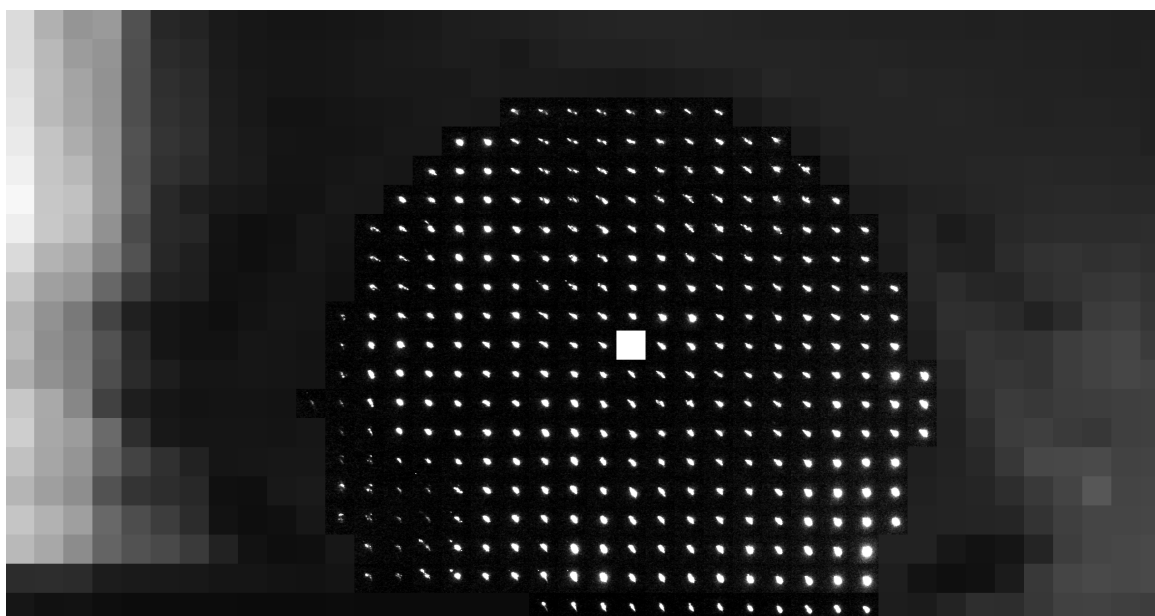


Figure 2: map of the  $\{200\}$  gold reflection along the sample area. Outside the sample area is a mapping of the central beam intensity, used for shape recognition. The white square in the middle is simply a marker.

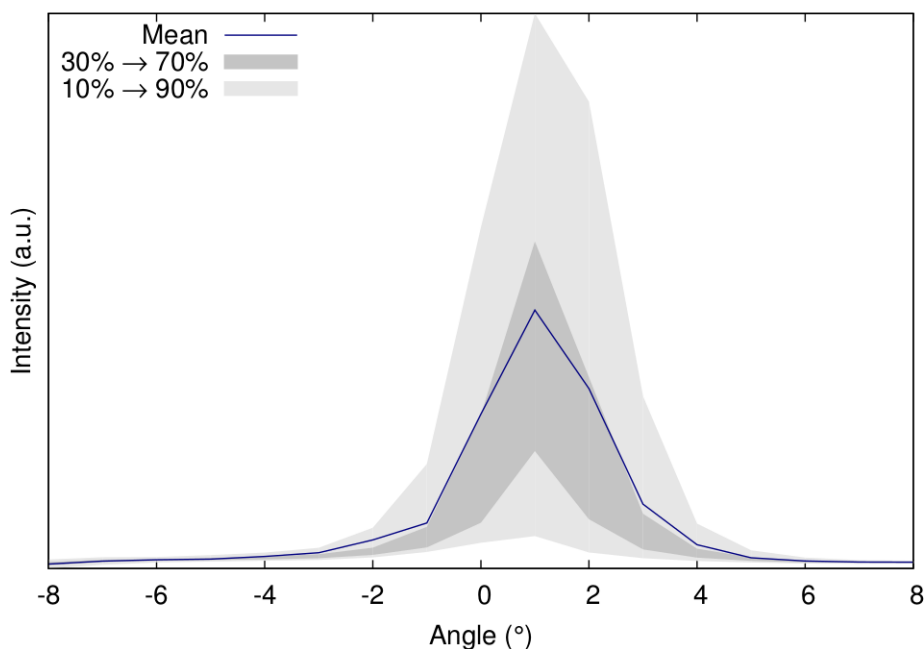


Figure 3: a rocking curve for the {200} gold reflections, as averaged over all the sample area.