PtyNAMi: Ptychographic nano-analytical x-ray microscope at PETRA III

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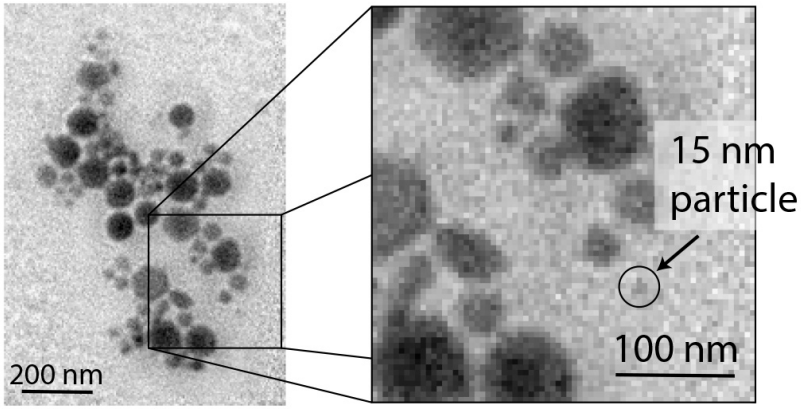
The x-ray scanning microscope PtyNAMi at PETRA III at DESY in Hamburg, Germany, is designed for high-spatial-resolution 3D imaging with high sensitivity. It is a multimodal hard x-ray scanning microscope that provides elemental, chemical, and structural information from inside an object using x-ray fluorescence, absorption, and small- and wide-angle scattering. In conventional scanning microscopy, the spatial resolution is limited by the lateral size of the nanobeam. Using nanofocusing refractive X-ray optics [1,2] and Fresnel zone plates [3] resolutions between 50 and 100 nm are reached in routine operation and beamsizes down to below 20 nm were demonstrated [2]. Scanning coherent diffraction microscopy also known as ptychography is provided as a routine imaging mode (also in combination with other modalities [4]) reaching spatial resolutions down to below 10 nm. With special ptychographic acquisition schemes using an in-vacuum pixel detector and an optional beamstop weak scattering signals from small features inside a sample can be captured (cf. Figure) [5]. The new instrument is presented together with applications in tomographic multimodal imaging.



Ptychographic reconstruction of a cluster of nanoparticles made of gold, platinum, and palladium deposited on a Si_3N_4 membrane. The smallest particles that can resolved are about 15 nm in size. For details see [5].

References

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