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The Nano-Diffraction Instrument of the NanoMAX Beamline at MAX IV

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The nano-diffraction instrument was the first nanoprobe endstation of the NanoMAX beamline at MAX IV and has been in user operation since 2017 [1]. It is based on a diffraction-limited KB mirror system with a long working distance of 100 mm and delivers a highly coherent nano-focused beam down to 40-200 nm, depending on the photon energy [2,3]. The alignment of the KB mirrors is routinely verified and adjusted based on the ptychographic reconstruction of a lithographic test structure [3,4]. The sample alignment is facilitated by a two-circle goniometer, a set of custom-built, long-stroke XYZ positioners, and a high-load XYZ piezo scanner. The entire sample positioning stack is optimized to accommodate sample environments weighing of up to 1000 g. In-situ optical microscopes, providing both on-axis and top-view perspectives, that assist in pre-aligning samples within the X-ray focus. A pixel detector inside an evacuated flight tube measures the forward-scattered signal. A robotic arm allows for the flexible positioning of a state of the art pixel detector in 3D for coherent diffractive imaging or Bragg ptychography [5]. Wide-angle scattering experiments can utilize a large-area detector positioned near the sample. The fluorescence signal emitted by the samples is captured by an energy-dispersive detector. The instrument is frequently used for experiments involving samples environments such as nano-indenters [6], electro-chemistry cells, XBIC setups [7], heaters, high-pressure cells [8], or other user-supplied setups.
We will present its capabilities, recent instrument improvements and upgrades, current sample environments, and results of selected user experiments.

Keywords: Nanoprobe, Ptychography, Cohrent Diffractive Imaging, Nano-Diffraction, X-Ray Fluoresecnce.

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I plan to submit also conference proceedings

No

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