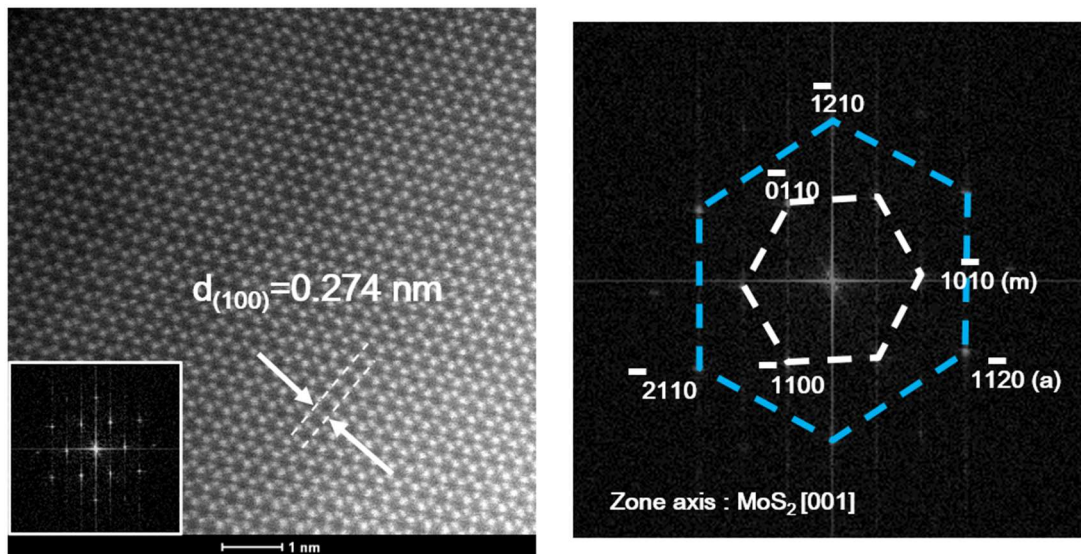


## Instrumentation of ptychographic microscopy at the atomic scale

Ptychographic electron microscopy at atomic-scale resolution had been established. A hybrid pixelated detector and remote controlled electron beam scanning coil were integrated on an aberration corrected scanning transmittance electron microscopy with a circular C2 aperture of 10  $\mu\text{m}$ . Experimental results shown that the 128 $\times$ 128 steps of electron probe interval (1  $\text{\AA}$ ) in real space with the size of each diffraction pattern is 512 $\times$ 512 pixels in high dynamical range. The 4D cube data of sampling areas were stable acquired at 200 kV with high diffraction space resolution. In addition, phase retrieval algorithms were developed to improve the point resolution of coherent diffraction imaging. Moreover, the lattice strain mapping was simultaneously interpreted with the high angle annual dark field image in nanostructural characterization by analysis the convergent beam electron diffraction patterns.



Atomic structure characterization of 2D MoS<sub>2</sub> materials (STEM HAADF image).