

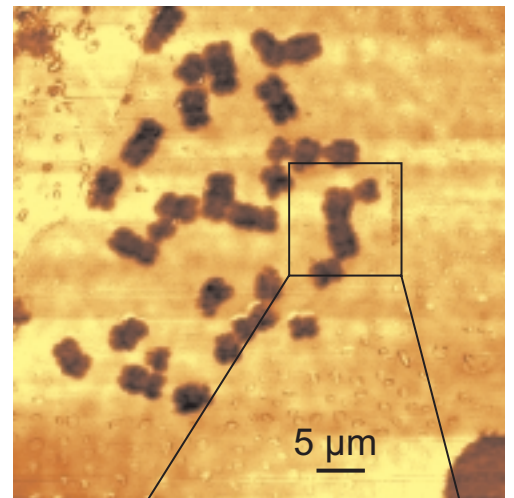
Scanning Near-field Optical Microscopy

Life Science Applications

Human Chromosomes in the Metaphase

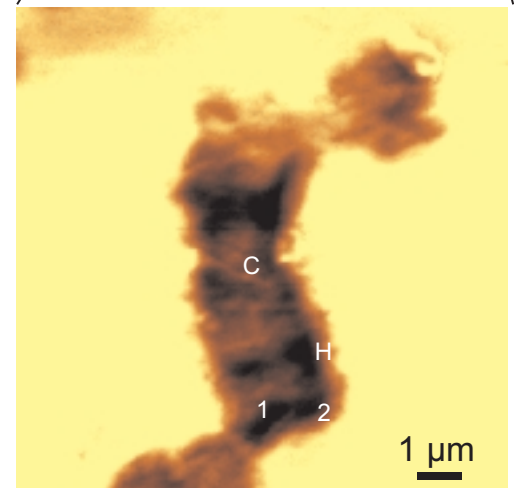
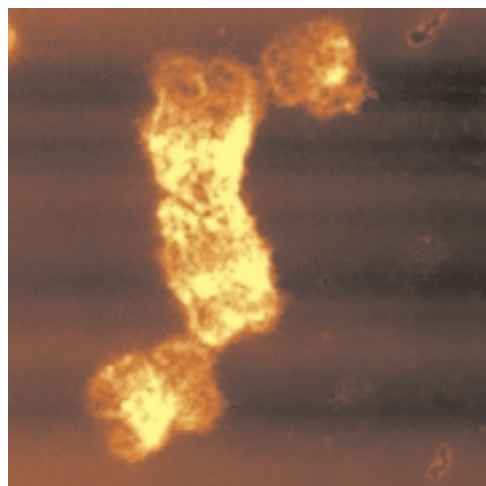
Optical and Topographical Images

The chromosomes were colour-labelled with toluoidin blue and then floated to a glass cover slip. The excitation laser had a wavelength of 532 nm. On the right side an overview of 50 μm x 50 μm was imaged. The nucleus can be seen in the corner.



Scanning Near-field Optical Microscopy allows the simultaneous acquisition of optical and topographical images.

The two images, a zoom-in of the upper picture, show the sample topography (left) and the simultaneously obtained optical image. The chromosomes exist of two chromatides (1+2), tied together at the cineotocher (C). The helical DNA (H) is seen in the dark areas. Scan range: 12 μm x 12 μm .



Chromosomal Dissection with AFM

Using standard AFM tips the AlphaSNOM provides the full capabilities of an Atomic Force Microscope.

Human metaphase chromosomes were dissected in the AFM mode. Compared to other techniques, the user can choose the region of interest more precisely.

Fig.1 shows an overview of a $60\ \mu\text{m} \times 60\ \mu\text{m}$ area from which a suitable chromosome was selected. This chromosome was imaged in fig. 2. Then the dissection was performed by increasing the setpoint to 2 V (fig. 3). With a one-line scan, a precise cut on a chosen region is possible. Fig. 4 shows a zoom-in of the cut ($3\ \mu\text{m} \times 3\ \mu\text{m}$) and in fig. 5 the corresponding cross section (along line AB) can be seen. The cut width is about 150 nm.

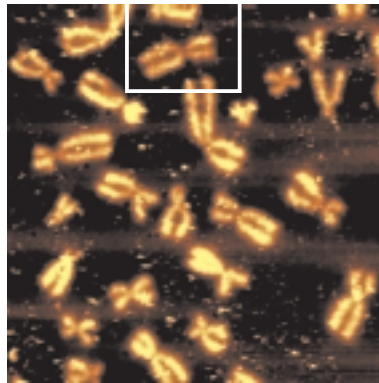


Fig. 1

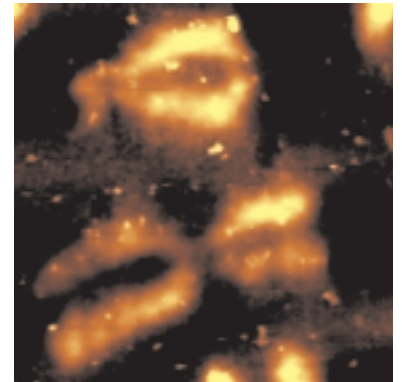


Fig. 2

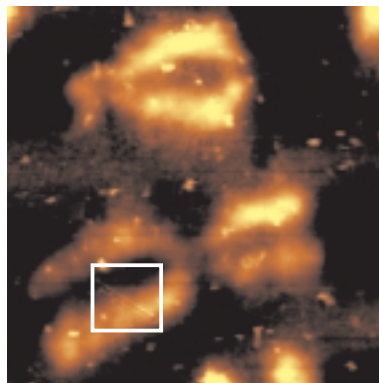


Fig. 3

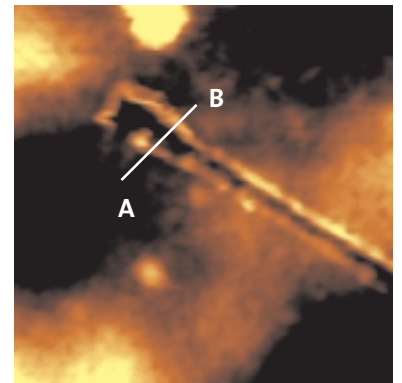


Fig. 4

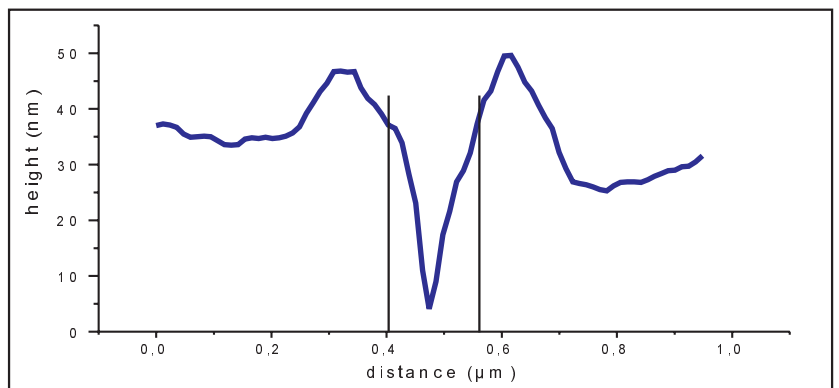


Fig. 5

Samples courtesy of Dr. H. Kehrer-Sawatzki University of Ulm, Germany