

# ATOMIC FORCE MICROSCOPE AS A TOOL FOR MORPHOMETRIC ANALYSIS OF BACTERIAL CELLS

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Significant progress in using of atomic force microscope as a tool for study of eukaryotic and prokaryotic cells has been reached during the past decades. As to prokaryotes, AFM is used not only for visualization, but also for investigation of such physiological processes as a growth, fission and spore-formation of bacterial cells. Our work is focused on the study of influence of antibiotic (ampicillin) on morphology of prokaryotic cells.

Bacteria *Bacillus cereus* were chosen for the experiments and were grown on nutrient medium with the presence of ampicillin at subbacteriostatic concentration. AFM experiments in contact mode of operation were carried out at air environment using SMM-2000 microscope (JSK "KPD", Russia).

Morphometric analysis was carried out on the following indicators: length, width, height and a mean square roughness of an objects surface. No less than 50 bacterial cells were processed with the subsequent averaging of the received data for intact and treated group of cells. Typical scans of bacteria are shown in figure 1, morphometry results are presented in table 1.

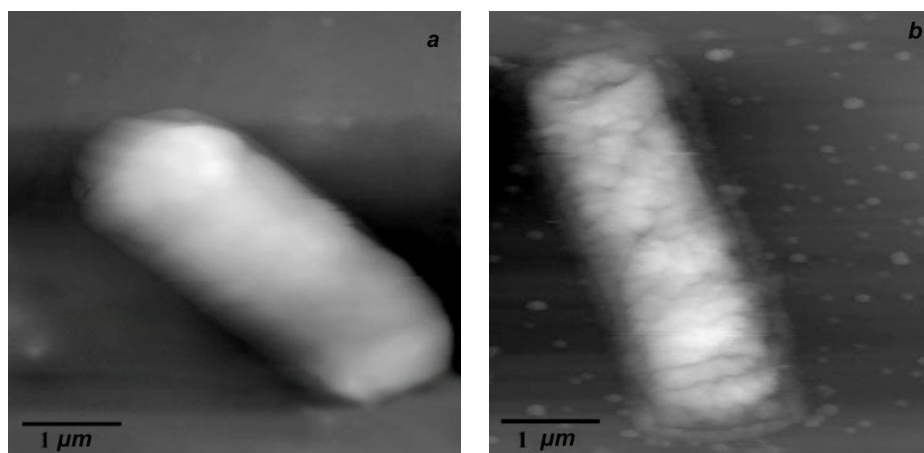


Figure 1: Typical images of intact *B. cereus* cells (a) and cells treated with ampicillin (b).

Table 1

<i>B. cereus</i> culture	Length, mkm	Width, mkm	Height, mkm	Roughness, nm
Intact cells	2,62 ±0,52	0,91±0,16	0,34±0,05	2,44±0,60
Treated cells	2,98 ±0,78	1,11±0,18	0,27±0,06	6,46±1,32
error probability, <i>p</i>	0,342	0,001	0,023	<0,001

Treating with ampicillin results in change of all studied morphological characteristics. These changes of spatial dimensions indicate spreading of treated cells on wafer surface, that induced by decrease of cell wall rigidity. Substantially changes have concerned in roughness of a surface - the parameter that describes uniformity of peptidoglycan layer of bacterium cellular wall. The increase in the roughness indicates a failure of peptidoglycan layer structure of treated with ampicillin bacteria. These changes are clearly visible in figure 1(b).