DEPENDENCE OF THE FRACTAL PROPERTIES ON THICKNESS FOR TITANIUM FILMS

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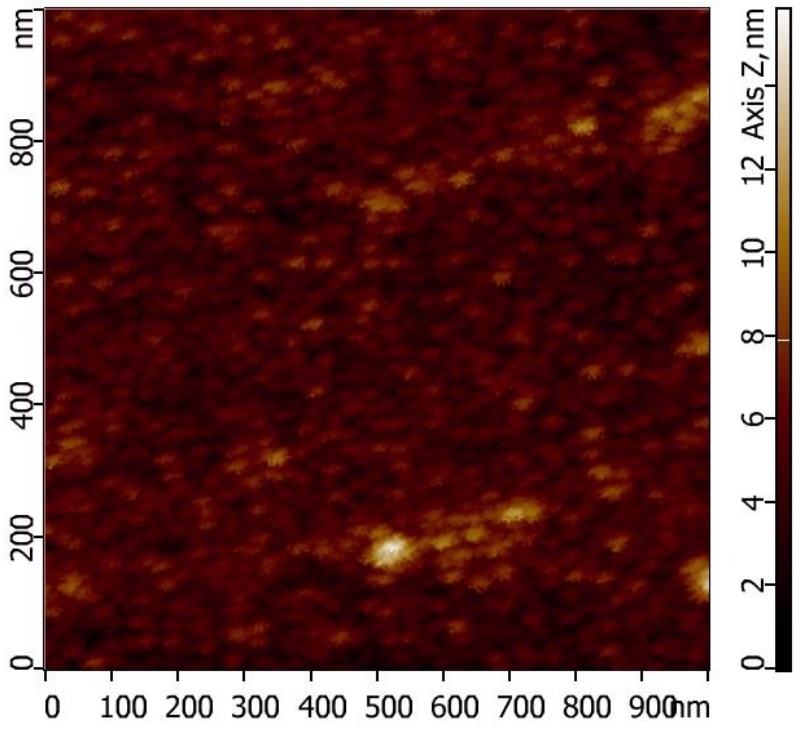
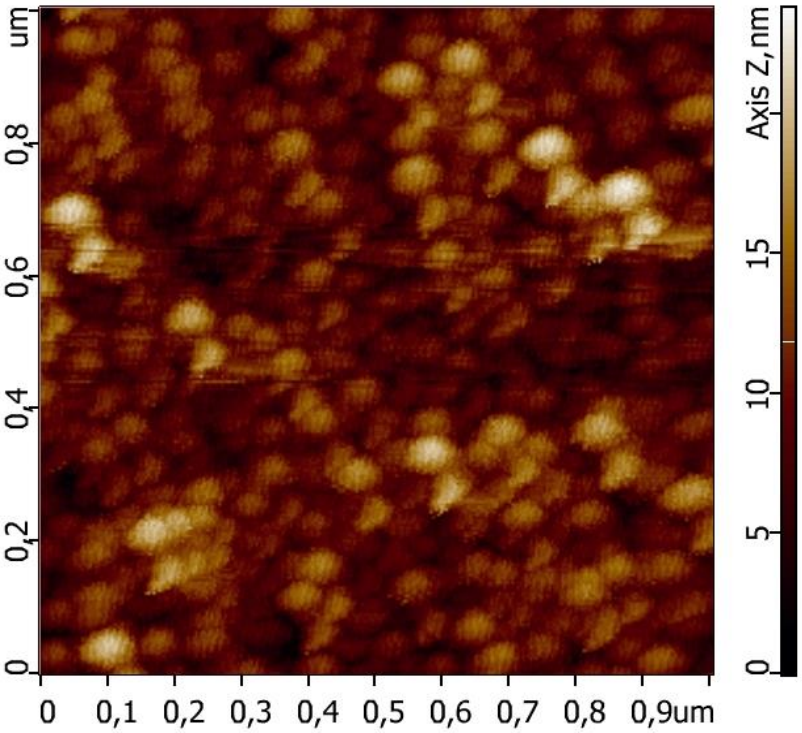
For probe microscopy, problems of analysis and determination of the boundaries of objects and issues of development and testing of methods for calculating the structural characteristics of nanoscale films (considering thickness), including fractal dimension, are relevant. It was experimentally established in [1, 2] that films of *Au*, *Ag*, *Ni*, and *Cu* on dielectric substrates could form fractal structures. The work is devoted to testing and spreading the methods used in [1, 2] for nanoscale *Ti* films with various thicknesses. The surface topography of *Ti* films (with thickness 65, 90, and 110 nm correspondingly) was studied at room temperature on a SolverNext SPM. As a probe, the cantilever of the MFM10 series was used, intended for measurements with high spatial resolution. *Ti* films were formed on a substrate of mica by electron beam sputtering on an A700QE/DI12000 device (i.e., formed after cooling the island films, see Fig. 1). Evaluation of the fractal dimension and processing of graphic materials was carried out in the software package [3].



a



b

Fig. 1. SPM graphs of *Ti* films with different thicknesses: a – 65 nm, b – 110 nm.

In the Table the results of calculating the altitude parameters: the arithmetic mean of the absolute values of the profile deviations within the base length S_a, the standard deviation S_q, the sum of the average absolute values the heights of the five most giant projections of the profile and the depths of the five most giant troughs of the profile within the base length S_{10z}, the average value of the fractal dimension D_c has been presented.

Table. Morphological characteristics of *Ti* on a substrate of mica (sample scale – 1000 nm)

Film thickness, nm	S_a, nm	S_q, nm	S_{10z}, nm	D_c
65	1,078	1,421	12,897	2,48-2,54
90	1,219	1,535	11,136	2,51-2,59
110	2,576	3,273	22,424	2,43-2,56

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