

DEVELOPMENT AND UTILIZATION
OF ADVANCED ATOMIC FORCE MICROSCOPY
TECHNIQUES IN DIAGNOSTICS
OF THE ELECTROTECHNICAL MATERIALS.
CHOSEN PROBLEMS.

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ABSTRACT *Recent development of the materials science and increase of the significance of the nanomaterials, induces the utilization of the measurement tools allowing to obtain the information about the nanometer-scale phenomena, which have an major impact on the macroscopic properties of fabricated objects. Atomic force microscopy (AFM) is one of the diagnostic methods allowing to test various properties of the surface at micrometer and nanometer scale. It allows to perform the investigation in the wide range of the surface properties of the materials utilized in electrotechnics. Acquired data allows to understand the relations between the technology parameters and the properties of the materials, therefore one can obtain the final product with desired qualities by modifying the production process and influencing its nanoscopic structure.*

This dissertation presents development and utilization of selected advanced AFM techniques in examining mechanical, electrical, magnetic and thermal properties of the materials and structures such as: azomethines, sheet moulding compounds, silicon polymers, thin NiFe layers, semiconductor structures and graphene-based nanostructures. Obtained measurement data was used to demonstrate the interpretation possibilities in terms of referring to the technology parameters, other techniques tests results or the factors influencing the sample.

In order to provide the basic information, every chapter introduction contains the short description of theory and practical issues of certain measurement technique. Methods and solutions developed by author are presented in detail as no alternative source of the information can be available to the reader.

Demonstrated wide application spectra of described diagnostic methods proves the versatility and usability of atomic force microscopy in the research aimed at development of new, energy-saving and ecological materials for electrotechnics.

Keywords: *atomic force microscopy, nanoscale surface diagnostics, electrotechnics*