

This collection presents selected reports of the 2016 International Conference on “Physics, Mechanics of New Materials and Their Applications” (PHENMA-2016), taken place in Surabaya, Indonesia, 19-22 July, 2016 (http://phenma2016.math.sfedu.ru). The presented papers are divided into four scientific directions: (i) processing techniques, (ii) physics, (iii) mechanics, and (iv) applications.

Into the framework of the first theme, synthesis, structure, and structure-sensitive properties of lead-containing ferroelectric ceramics and crystals, different niobate materials; influence of mechanical and chemical activation on properties of ferroelectric, relaxor and multiferroic ceramics are considered, in particular: technologies of deposition of ZnO thin films, nanowires, and nanoparticles; processing carbon nanoparticles; influence of surface nanostructures on the formation mechanism of the anti-friction layer at tribocoract, including the presence of eco-friendly lubricants.

The second direction covers theoretical and experimental studies of nanorod-type 2D photonic crystals effects in ferroelectric ceramics; BST-ceramics and their thermodynamic prehistory, dielectric properties and phase diagrams; pyroelectric activity of pyroelectrics; different characteristics of lead ferriobiobate modified ceramics; electromagnetic and thermodynamic properties of structures doped by a wide spectrum of rare elements, bismuth ferrites; phase transitions and phase diagrams of multicomponent macroscopically inhomogeneous materials with special electric-magnetic properties; parameters of LSMO-thin films and adsorptive films based on modified organic compound; phase transitions in the rare-gas solids under pressure.

From the viewpoint of mechanics in the third section, there are studied and modeled piezoceramic materials with micropores and metalized pores; wave field localization in functionally graded coatings and surface SH-saves in piezoelectric structures with inhomogeneous coating; longitudinal waves in triple-periodic array of rigid spherical inclusions; pipe with volumetric surface defects; residual stress-strain state in rod; influence of defects on parameters of transverse vibrations of transmission tower; effect of loading type on the displacement of cantilever plate; acoustic-emission diagnostics of the kinetics of galvanic process.

The fourth direction demonstrates novel results in modeling and experimental studies of planar nanosized multigraphene/SiC field emission structures; gas sensors based on sapphire and perovskite solar cells with $p-i-n$ structure; piezoelectric resonators and chemosensors based on ZnO nanorods; electromagnetoeelastic actuator for nano- and microdisplacement; low-frequency ultrasound transducers for oil well diagnostics; complex geometry electrolyzers and electrolytic bath as element of electric circuit; comparative load capacity of Novikov gearing and involute gearing; use of technogenic raw materials for production of building materials and concrete. The fifth direction is linked with studies of business development of small and medium enterprises and also improvement of company efficiency; feasibility of construction project investment and global manufacturing industries; domestic sewage and new type constructed wetlands; marketing strategy model and management information systems; modern secured distributed system of electronic document circulation; determination of the parameters of object of management; arrangement of vibration expert system, and development of game content model.

The book will be useful to students, post-graduate students, scientists and engineers, taking part in R&D of modern piezoelectrics and magnetic materials and composites, nano-structures and other advanced materials, and also different devices, demonstrating broad applications in different areas of science, technique and technology. The book includes new studies and results in the fields of material science, condensed matter physics, physical and mechanical theory and experiment, processing techniques and engineering of advanced materials and composites, numerical methods, and also different applications (including industrial) of developed devices and goods, investment approaches and management issues proper for these areas.

The articles of this volume will not be indexed individually. For the preceding conference see [the first author (ed.) et al., Advanced materials. Manufacturing, physics, mechanics and applications. Selected papers based on the presentations at the international conference “Physics, mechanics of new materials and their applications”, PHENMA, Azov, Russia, May 19–22, 2015. Cham: Springer (2016; Zbl 1353.82090)].