Study program: Electrical Power Engineering - Advanced Materials and Technologies in Electrical Engineering

Type and level of studies: Phd Studies

Course unit: Advanced Ceramic Nanomaterials

Teacher in charge: Jelena M. Purenovic

Language of instruction: English

ECTS: 10

Prerequisites: -

Semester: Winter

Course unit objective:

Acquiring fundamental theoretical knowledge in the field of modern ceramic nanomaterials, along with their practical applications, involves understanding size effects, nanoparticle charging, and their continuous movement in fluids.

Learning outcomes of Course unit:

The ability to apply acquired knowledge in the field of researching contemporary nanomaterials, with a focus on dielectric and ceramic nanostructured materials, as well as metal and oxide nanofilms.

Course unit contents:

Theoretical classes

Nanoparticles. Characterization methods of nanomaterials. Classification and applications of nanomaterials. Ceramic nanomaterials. Composite nanomaterials. Porous nanomaterials. Nanotubes. Optical nanomaterials. Dielectric nanomaterials. Physical properties of dielectric materials. Concept of fractals. Fundamental concepts of fractal analysis of sintered ceramic nanostructured materials.

Practical classes

Part of the curriculum involves independent study and research work, which includes actively following, organizing, and analyzing scientific results within selected fields. It also involves writing scientific papers within the subject area and publishing them in conferences and journals.

Literature:

[1] B. Tareev, Physics of dielectric materials, English Translation, Mir Publishers, 1979.
[2] M. F. Barnsley, Fractals Everywhere, Orlando, Florida, Academic Press, 1988.
[3] C. P. Poole, F. J. Owens, Introduction to nanotechnology, John Wiley & Sons, Inc., 2003.
[4] B. Bhushan (Ed.), Springer Handbook of Nanotechnology, Springer Science+Business Media, 2007.
[5] A. V. Zvelindovsky (Ed.), Nanostructured Soft Matter, Experiment, Theory, Simulation and Perspectives, Springer Canopus Publishing Limited, 2007.
[6] C. Dupas, P. Houdy, M. Lahmani (Eds.), Nanoscience, Nanotechnologies and Nanophysics, Springer-Verlag Berlin Heidelberg, 2007.
[7] J. Purenović, Svojstva i primena multifunkcionalne mikrolegirane kompozitne alumo-silikatne keramike kao aktivnog dielektrika sa nanostrukturnim metalnim filmovima na amorfno-kristalnoj matrici, uz fraktalnu prirodu granice zrna, Institut za nuklearne nauke „Vinča“, 2016.

Number of active teaching hours: 7	**Lectures: 5**	**Practice: 2**

Teaching methods:

Interactive teaching, consultations, study and research work

Evaluation (maximum number of points 100)

Completed and defended seminar work: 50

Exam theoretical part: 50