Advanced Materials for the Future

How our organisms interact…

Centre of Excellence (CoE) NAMASTE, Advanced Materials and Technologies for the Future, is a multidisciplinary and transdisciplinary consortium, dedicated to merging academic, technological and business expertise, skills and equipment, in order to foster crucial technological progress in selected areas relating to inorganic non-metallic materials and their application in electronics, optoelectronics, photonics and medicine. The strategic goals of CoE NAMASTE are: continuity in research excellence, multidisciplinary interconnection, knowledge dissemination and technology transfer. CoE NAMASTE began operating in 2010.

Our particular strength is an excellent balance between fundamental and applied research: while the former delivers solutions that can be transformed into technical products or services on a relatively short timescale, the latter will provide the basis for future technologies, which are not necessarily anticipated at the current time. The centre's research is conducted within six projects, all carried out with strong cooperation from business/private sector partners.

Some of our exceptional results are:

Highly sensitive ceramic membranes – the large aspect ratio of the dimensions of a buried cavity will make it possible to fabricate highly sensitive ceramic membranes within ceramic 2D and 3D microsystems, created by low-temperature co-fired ceramic (LTCC) technology.

High-voltage protection and electromagnetic radiation protection – new developments in materials for low-doped ZnO varistors for high-voltage protection include: energy varistors with high current stability under DC voltage for overvoltage protection of renewable energy sources, and very thin disc shaped gas discharge tubes (GDT) for optimised serial connection with varistors (MOV) into miniaturised GDT/MOV surge protection devices.

Prototypes for electromagnetic radiation protection include: synthesis of various ferrite nano and micro-powders as fillers for the preparation of ferromagnetic composites, tuned for electromagnetic (EM) absorption in the range 500MHz to 10GHz, and synthesis of magnetic nanopowders for preparation of stable magnetic fluids for applications in biomedicine.

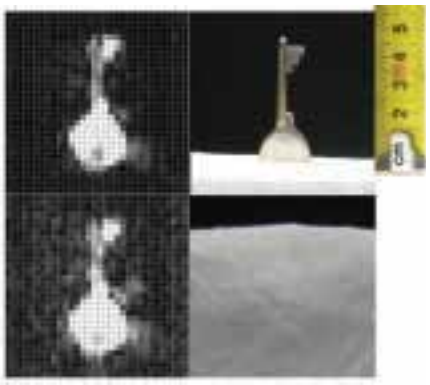
THz field detection – being 'world champions' in THz field detection, our key competence is the ability to design and fabricate both micro and nanosensors and microactuators together with advanced sensor signal processing in state-of-the-art CMOS nanotechnologies. Examples are: integrated antenna bolometer array for THz imaging, vapour sensor array for extremely low molecules concentration in the air $<10^{-12}$, and micromachining technologies for advanced micro-reactors and pumps.

3D microlaser – being the first in the world to create a 3D microlaser, photonics promises revolutionary development in energy harvesting and communication technologies in the near future.

Chiral nematic liquid crystals – we are a leader in studying phenomena in chiral nematic liquid crystals.

Electrocaloric phenomenon – we have measured the world's highest electrocaloric phenomenon.

Nanomaterials and living cells – we are developing new methods for investigating the interaction between nanomaterials and living cells, as the exceptional properties of novel materials bring new applications, they will also bring more responsibilities.



THz Sensor System (300GHz – λ=1mm)

If you care about how our organisms interact with our environment and respond to your new materials and technologies, the knowledge and research infrastructure of CoE NAMASTE can help you explore biocompatibility of your materials or processes and trace the uptake of nanomaterials into environment and organisms.

REPUBLIC OF SLOVENIA
MINISTRY OF EDUCATION, SCIENCE, CULTURE AND SPORT

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European Regional Development Fund

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