FZU
Institute of Physics of the Czech Academy of Sciences

SEMINAR

**26. 9. 2023 | 14:00**

lecture hall
Cukrovarnická 10, 162 00, Praha 6


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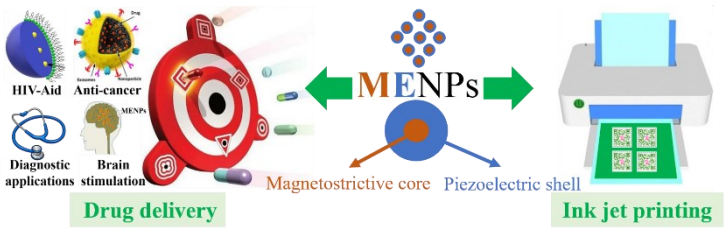
## Magnetoelectric Nanoparticles: From Well-Controlled Synthesis to Enhanced Magnetoelectric Coupling and Colloidal Stability

Magneto-electric nanoparticles (MENPs), formed by magnetostrictive core and piezoelectric shell, have attracted significant attention as a promising nanomaterial for use in biomedicine. MENPs have the potential to revolutionize targeted, site-specific drug delivery and controlled release of drugs triggered by physical stimuli. In addition, MENPs could be utilized in electronics, specifically in actuators, antennas, and sensors that can be fabricated via inkjet printing. The potential uses of MENPs are exciting, but the field is still in its early stage because of the difficulty of synthesizing colloidally stable, well-defined MENPs with tunable magnetic characteristics.

The first objective of this interdisciplinary project is to develop a novel synthesis strategy for colloidally stable $Co_xNi_yFe_{(3-x-y)}O_4@BaTiO_3$ MENPs with well-defined core-shell morphology, a high magnetoelectric coefficient and tunable magnetic characteristics. The subsequent phase will include the implementation of comprehensive physical investigations with case studies on the drug delivery, including an unprecedented nanosystem with twofold control of drug release triggered by magnetoelectric and hyperthermic effects, and inkjet printing.




*MENPs and their applications with special regard to this project.*

In this seminar, preliminary results of this project, realized within the MSCA Fellowships CZ FZU II, will be discussed. Specifically, $CoFe_2O_4@BaTiO_3$ nanomaterials have been synthesized by means of a multistep procedure via a titania-coated intermediate and then by a solid-state reaction. Structural, morphological, and magnetic results of the preliminary investigation of these samples will be addressed.


This event is supported by **MSCA Fellowships CZ FZU II**
registration number: CZ.02.01.01/00/22_010/0008124..

Co-funded by the European Union

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