

CEIPEX IPM – overview of topics

1	CEIPEX RESEARCH TOPIC LEVEL2	Advanced Nano & Micro technologies / fabrication & characterisation of nanostructures
2	RESEARCH GROUP	Multiscale Modelling and Measurements of Physical Properties
3	TOPICS/FOCUS	Nanoassemblies for magnetic delivery and controlled release of cancerostatic agents (NANOMAGIC)
4	SUMMARY	Cancer remains a defining biomedical challenge of the 21st century. NANOMAGIC project integrates nanomaterial engineering with coordination chemistry to create magnetically controllable nanoassemblies for on-demand metallodrug release. Monodisperse magnetic iron-oxide NPs will be functionalized with thermo- (and redox-) labile linkers bearing Pt- and Ru-based metallodrugs. Under an alternating magnetic field, the NPs generate localized heating and motion, selectively cleaving the linker to trigger drug release at the target site while preserving modularity for rapid and tailored re-design. The project builds on institutional expertise and preliminary data demonstrating (i) robust magnetic nanoparticle systems and (ii) pronounced tumor size reduction in vitro and in vivo with prototype Pt metallodrug formulations. As a CEIPEX Fellow, the applicant will expand from molecular design and SAR of Pt/Ru complexes to magnetothermal nanoplatfoms by: (1) optimizing linker chemistry for defined thermal/redox thresholds and serum stability and (2) assembling and characterizing nanoformulations (TEM, DLS, ζ-potential, SAR, release kinetics, modeling of nanoscale heat profiles). As such, the project will push the nanoplatfom efficacy and in vitro investigation (2D/3D models), advancing top candidates toward in vivo evaluation. Expected outcomes are: (i) a bioevaluated library of Pt- and Ru-loaded magnetic nanoassemblies ready for subsequent in vivo testing, and (ii) a postdoctoral researcher trained across nanomaterial development and bioinorganic chemistry, equipped with CEITEC's cross-disciplinary network and instrumentation to launch an independent research program in targeted cancer nanotherapeutics.
5	RG WEBPAGE / CONTACT	https://www.ipm.cz/en/groups/viceurovnove-modelovani-a-mereni-fyzikalnich-vlastnosti#