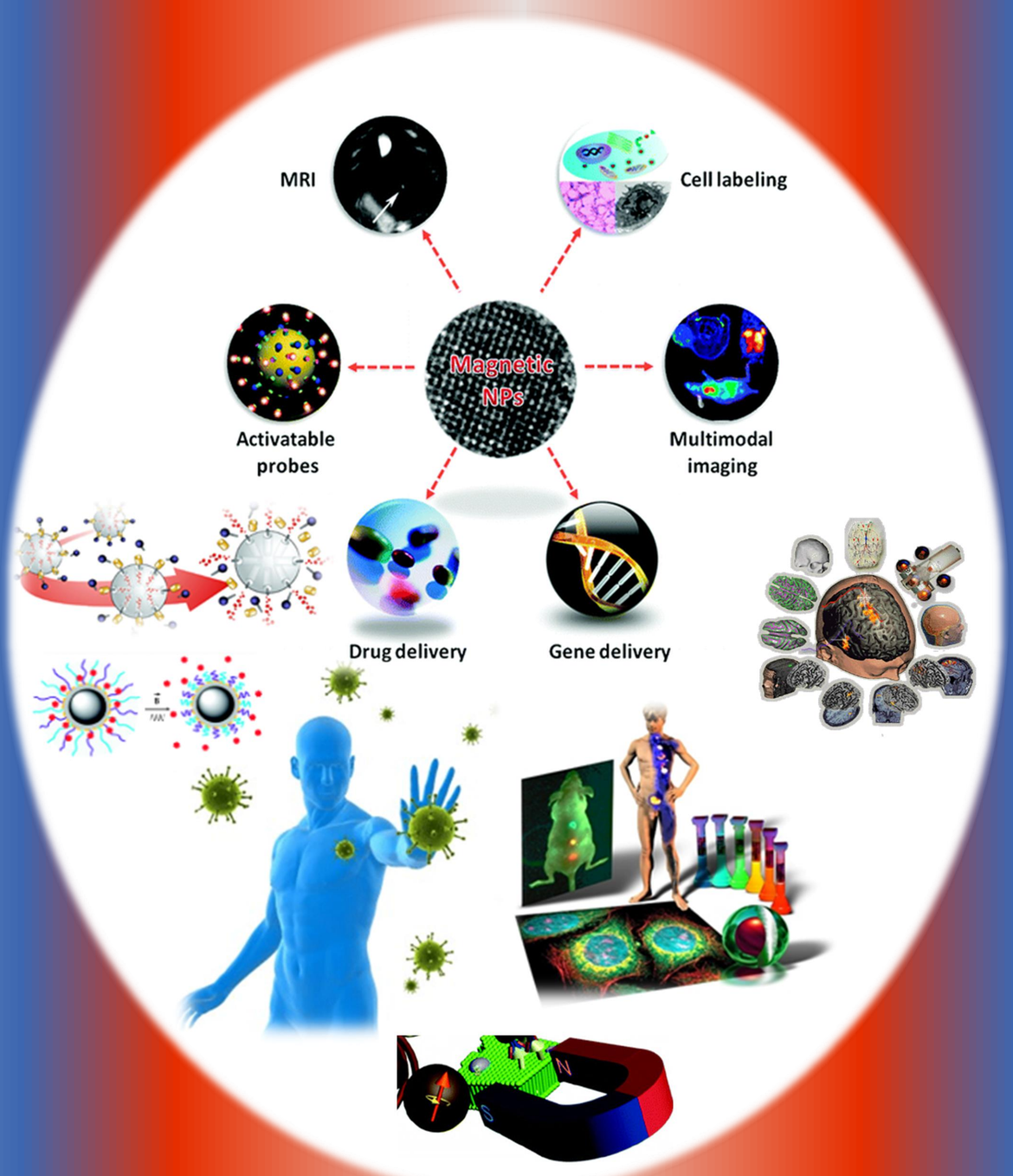
1st Training Workshop & Summer School

On Magnetic Nanohybrids for Cancer Therapy

within the framework of the MaNaCa Twinning|Horizon2020 project: grant agreement No 857502 (2019-2022)



25-28 August 2020

Balkan Center-CIRI-AUTh, Thessaloniki-Greece

http://magnacharta.physics.auth.gr/manaca-workshop.htm

Magnetic Nanostructure Characterization: Technology & Applications

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Lab Courses

Tuesday, August 26, 2020
17^{30}-19^{30}

Lab Course 01: Young researchers: Present & Publish

M. Farle, Germany: *How to make a good scientific oral presentation*
***C. Bratsas, S. Zapounidou, Greece**: How to avoid predatory journals and plan your publication strategy*

Oral presentations at a conference or internal seminar are for sharing your research work with other scientists. They must convince the audience that the research presented is important, valid, and relevant to them. To this end, oral presentations must emphasize both the motivation for the work and the outcome of it, and they must present just enough evidence to establish the validity of this outcome. They are localized in space and time, they impose a sequence and rhythm to the audience, and they normally include some level of interaction.

Predatory publishing, sometimes called write-only publishing or deceptive publishing, is an exploitive academic publishing business model that involves charging publication fees to authors without checking articles for quality and legitimacy and without providing the other editorial and publishing services that legitimate academic journals provide, whether open access or not. They are regarded as predatory because scholars are tricked into publishing with them, although some authors may be aware that the journal is poor quality or even fraudulent. According to one study, 60% of articles published in predatory journals receive no citations over the five-year period *following publication.*

Wednesday, August 27, 2020
17^{30}-19^{30}

Lab Course 02: Young researchers: Propose & Manage

G. Brandon, Luxemburg: *H2020 MSCA Individual Fellowships for the young researchers*

What are the MSCA Individual Fellowships? Grants provided by Marie Skłodowska-Curie Actions are available for all stages of a researcher's career, irrespective of nationality. Fellows include PhD candidates and those carrying out more advanced research. Researchers working across all disciplines, from life-saving healthcare to 'blue-sky' science, are eligible for funding. Because they encourage individuals to work in other countries, the MSCA make the whole world a learning environment. They encourage collaboration and sharing of ideas between different industrial sectors and research disciplines – all to the benefit of the wider European economy. MSCA also back initiatives that break down barriers between academia, industry and business. By means of the MSCA Individual Fellowships scientists have the possibility to gain experience abroad and in the private sector, and to complete their training with competences or disciplines useful for their careers.

Thursday, August 26, 2020
17^{30}-19^{30}

Lab Course 03: Young researchers: Samples & Biomedicine

E. Myrovali & K. Kazeli, Greece: Hands on Samples for biomedical applications

Iron oxide nanoparticles (MNPs) have emerged as one of the primary nanomaterials for biomedical applications due to their long blood retention time, their biodegradability and their low toxicity. They can be used in technological applications, including clinical needs such as magnetic hyperthermia. Among the widely used synthesis routes used for synthesizing iron oxide MNPs are coprecipitation, thermal decomposition, microemulsion, and sol-gel methods. However, compared to other synthesis routes, the coprecipitation method is generally preferred due to its high yield and facile controls. More specifically, for the coprecipitation reaction, the concentration of precursors and the reaction temperature significantly affect the size, size distribution, phase and surface chemistry of resultant MNPs. First, we present the synthetic route using the aqueous chemical coprecipitation method. It has been highlighted as a cost-effective and fast process, easily expandable on an industrial level. Using the aqueous version of this method, we may avoid the use of hazardous solvents and reagents and high reaction temperatures or pressures. In that sense, aqueous coprecipitation can be considered to be eco-friendly. It is the simplest method to prepare MNPs from aqueous iron salt (Fe^{2+}, Fe^{+3}) solution. Next, we present the fabrication processes used to produce phantom with agarose solution. Gels and especially those from agarose, are routinely used as phantom models while they comprise the only transparent porous materials which successfully simulate animal tissues.

Friday, August 26, 2020
17^{30}-19^{30}

Lab Course 04: Young researchers: Magnetic Hyperthermia

A.R. Tsiapla, N. Maniotis, A. Makridis, Greece: *Hands on Magnetic Particle Hyperthermia: Experiment & Evaluation*

This Lab Course is focusing on the experiment as well as on the evaluation of Magnetic Particle Hyperthermia. After a brief introduction on the magnetic hyperthermia origin following a short presentation on the Magna Charta lab devices and equipment, the experimental process will be analyzed and presented in a real-time demonstration. Adjusted protocols and experimental strategies will be presented, targeting to the best heating results under harmless routes. Experimental part ends with the heating evaluation of the examined nanoparticle system.

Next, the computational approach of the aforementioned experiments will be presented. More specifically, recommended strategies on how to build numerical models for the description of the phenomena that take place in a Magnetic Hyperthermia *in vitro* system will be shown. In particular, we aim at the estimation of the spatial distribution of the magnetic field and the spatiotemporal temperature distribution by taking into account all the appropriate field and heat transfer boundary conditions. Moreover, we will demonstrate computationally a strategy, to mitigate eddy currents heating, by applying the external magnetic field intermittently (in an ON/OFF fashion), instead of the continuous mode typically used in Magnetic Hyperthermia studies.

Finally, a 3D-printed device for studying an alternative bio-application of applied magnetic fields on MNPs and cells, known as magnetomechanical effect, will be introduced and presented to participants.

Poster Presentations

Num	Title & Presenting Author
P01	Regional Focus effect on Magnetic Particle Hyperthermia ***E. Myrovali**, MagnaCharta, CIRI-AUTH, Thessaloniki Greece*
P02	Combinatory magnetothermal and magnetomechanical stress on human breast cell lines ***A. R. Tsiapla**, MagnaCharta, CIRI-AUTH, Thessaloniki Greece*
P03	In vitro response of normal and cancerous cell lines under magneto-mechanical activation ***A. R. Tsiapla**, MagnaCharta, CIRI-AUTH, Thessaloniki Greece*
P04	In vitro and in vivo study of magnetic nanoparticles with potential for anti-tumor therapy ***V. Uzunova**, Institute of Biophysics and Biomedical Engineering, BAS, 1113 Sofia, Bulgaria*
P05	Synthesis and Characterization of MagnetoElectric $BiFeO_3$ nanoparticles ***K. Papadopoulos**, MagnaCharta, CIRI-AUTH, Thessaloniki Greece*
P06	Synthesis and characterisation of magnetic bio ceramics nanoparticles for medical applications ***K. Kazeli***, International Hellenic University, Thessaloniki, Greece
P07	Oxidative stress analysis, haemolytic activity and cytotoxicity of bioactive glass-ceramics nanomaterials, ***K. Kazeli***, International Hellenic University, Thessaloniki, Greece
P08	Fe-Fe_3O_4 "Core-Shell" Nanoparticles: Synthesis and Characterization ***G. Chilingaryan***, *Institute for Physical Research, National Academy of Sciences of Armenia, Ashtarak, Armenia*
P09	Fe-Fe_3C "Core-Shell" Nanoparticles: Synthesis and Characterization, ***H. Gyulasaryan***, *Institute for Physical Research, National Academy of Sciences of Armenia, Ashtarak, Armenia*
P10	Novel tissue engineering scaffolds and liposomal formulations loaded with Alkannins/Shikonins for dermal applications ***A. S. Arampatzis, A. E. Koletti,** Chemical Engineering Department, Aristotle University, Thessaloniki-Greece*
P11	An NMR and LC-MS based metabolomics approach to elucidate the mechanism of action of alkannin and shikonin on breast cancer cell line MCF-7 ***A. Nakas**, Chemical Engineering Department, Aristotle University, Thessaloniki-Greece*
P12	Nanostructured permanent magnets: Materials, geopolitical prospects, future challenges & recycling, ***G. Sempros**, School of Physics, Aristotle University of Thessaloniki-Greece*
P13	Superparamagnetic Splenic Macrophages: Magnetic Characterization and Investigation of Immune Response by Low-frequency Magnetic Stimulation, ***N. Tetos**, Fakultät für Physik, Universität Duisburg-Essen-Germany*
P14	Revolutionary green perovskite or perovskite-like solar cells ***L. Theofylaktos**, NCSR Demokritos, Athens-Greece*
P15	Blood cancer: New insights of Oxidative stress in carcinogenesis ***I. Tsamesidis**, Université de Toulouse, IRD, UPS, Toulouse, 31400, France*
P16	Design and construction of 3D-printed magnetic tools for biomedical applications ***P. Kyriazolopoulos**, MagnaCharta, CIRI-AUTH, Thessaloniki-Greece*
P17	CoCrFeMnNi High Entropy Alloy Nanoparticles from the gas phase ***I. N. Sahin**, Fakultät für Physik, Universität Duisburg-Essen-Germany*
P18	Standardizing magnetic hyperthermia experiment: a protocol for a reliable measurement ***A. Makridis,** MagnaCharta, CIRI-AUTH, Thessaloniki Greece*
P19	A Multiphysics Model for the Hyperthermia Treatment of Residual Bone Tumors Cells Using Magnetic Scaffolds, ***M. B. Lodi**,* Dept. Electr. & Electron. Engin. University of Cagliari, Cagliari Italy
P20	X-ray spectroscopic study of magnetic ferrite nanoparticles for theranostic applications: effect of size and distribution, ***F. Pinakidou**, School of Physics, Aristotle University of Thessaloniki-Greece*
P21	Estimating the effective anisotropy of ferromagnetic nanoparticles through magnetic and calorimetric simulations, ***N. Maniotis,** MagnaCharta, CIRI-AUTH, Thessaloniki Greece*
P22	Nanoimprint Defined Magnetic Nanoplatelets for Cancer Treatment and Biomedicine ***J. Li**, Department of Applied Physics, Eindhoven University of Technology-Netherlands*
P23	Magnetic characterization of Fe/Fe_3C nanoparticles fabricated by solid state pyrolysis ***E. Papadopoulou**, Fakultät für Physik, Universität Duisburg-Essen-Germany*

Thessaloniki-Greece, August 25-28/2020

Program

	Tuesday 25.08.2020	Wednesday 26.08.2020	Thursday 27.08.2020	Friday 28.08.2020
$09^{00} - 11^{00}$	*Arrivals*	**Materials & Structure** **O04: M. Spasova, Germany** *Characterization of nanomaterials using transition electron microscopy* **O05: C. Dendrinou, Greece** *Nano-Theranostics based on magnetic ferrite nanoparticles* **O06: M. Katsikini, Greece** *Application of X-ray absorption fine structure spectroscopies for the study of $Fe_{3-x}Mn_xO_4$ nanoparticles*	**Biomedical constraints** **O12: G.Litsardakis, Greece** *Magnetic liposomes as versatile clinical carriers* **O13: M. Efremova, Germany** *Magnetite-Gold nanohybrids as ideal platforms for theranostics* **O14: U. Hofmann, Germany** *The Blood-Brain-Barrier as target for magnetic nanoparticle imaging and opening*	**Cancer specific aspects** **O17: C. Chlichlia, Greece** *Enhancing cancer immunotherapy through Nanotechnology* **O18: M. Abakumov, Russia** *Magnetic nanoparticles for cancer therapy and diagnostics: effects of morphology and coating* **O19: C. Tapeinos, Italy** *Cell membrane-coated magnetic nanocubes for the treatment of glioblastoma*
11^{00} - 11^{40} *Coffee Break*				
$11^{40} - 13^{00}$	*Registration* *On Site & Web*	**Magnetism & Properties** **O07: P. Trohidou, Greece** *Tuning structure and Magnetic Properties of Nanoparticles for Enhanced Heating Performance* **O08: U.Wiedwald, Germany** *Basics of Magnetometry and How to Apply on Nanoparticles*	**Biomedical constraints** **O15: C. Spiridopoulou, Greece** *Cancer nanomedicine: considerations for the in vitro experimental design* **O16: R. Tzoneva, Bulgaria** *How cells respond to magnetic field? Magnetic hyperthermia for cancer treatment*	**Cancer specific aspects** **O20: S. Spirou, Greece** *The Radiobiological Basis of Radiation Therapy and Hyperthermia* **O21: N. Carvou, UK** *Magnetic Particle Imaging Applications in Cancer Inflammation, Theranostics, and Cell Tracking* **O22: T. Samaras, Greece** *Combinatory, Magnetic or Non-magnetic cancer modalities?*
$13^{00} - 15^{00}$ *Lunch Break*				
15^{00}-17^{00}	**O01: M. Angelakeris, Greece** *Magnetic Nanohybrids for Cancer Therapy* **Materials & Structure** **O02: A. Manukyan, Armenia** *Iron based "Core-Shell" Nanoparticles for Magnetic Hyperthermia of Cancer Cells* **O03: Simeonidis, Greece** *Scaling Up Magnetic Nanoparticles Production*	**Magnetism & Properties** **O09: T. Feggeler, Germany** *Introduction to X-Ray Magnetic Circular Dichroism* **O10: A. S. Kamzin, Russia** *Core-Shell and Bi-phasic MNPs for cancer therapy: Structure and properties* **O11: A.Semisalova, Germany** *Ferromagnetic Resonance: Theory and Applications for Magnetic Nanoparticles*	**Poster Session** **P01-P12** *5 min flash presentations (5-8 slides)* + *5 min questions per poster* *On-site participants may hang their A0 printed posters in Poster Session Room*	**Poster Session** **P13-P23** *5 min flash presentations (5-8 slides)* + *5 min questions per poster* *On-site participants may hang their A0 printed posters in Poster Session Room*
$17^{00} - 17^{30}$ *Coffee Break*				
17^{30}-19^{30}	**Lab Course 01** **Young researchers Present & Publish** **M. Farle, Germany** *How to make a good scientific oral presentation* ***C. Bratsas, S. Zapounidou, Greece*** *How to avoid predatory journals & plan your publication strategy*	**Lab Course 02** **Young researchers Propose & Manage** **G. Brandon, Luxemburg** *H2020 MSCA Individual Fellowships for the young researchers*	**Lab Course 03** **Young researchers Samples & Biomedicine** **E. Myrovali & K. Kazeli, Greece** *Hands on Samples for biomedical applications*	**Lab Course 04** **Young researchers Magnetic Hyperthermia** **A.R. Tsiapla, N. Maniotis & A. Makridis, Greece** *Hands on Magnetic Particle hyperthermia: Experiment & Evaluation*