INORGANIC NANOPARTICLES FOR BIOMEDICAL & TECHNOLOGICAL APPLICATIONS

Melita Menelaou, Chemical Engineer PhD, Cyprus
University of Technology, CYPRUS

Abstract (300 word limit)

Magnetic nanoparticle (MNP)-based theranostics are emerging as important tools for diagnosis and treatment (theranostics) of various cancer types, and bone disorders. Synthesis of MNPs who can act as Magnetic Resonance Imaging contrast agents with high relaxivity and low toxicity is one of the major pre-requisite in the field of theranostics [1].

Also, such applications require magnetic nanoparticles with well-defined composition, narrow size distribution, and high saturation magnetization values for enhanced interaction with an externally applied magnetic field. Spinel ferrites with the general formula MFe_2O_4 (M = Mn, Fe, Co, Ni) have been proposed among others to act of MRI contrast enhancement agents among other types of MNPs based on both transition metal ions and rare earth elements in the presence of various organic moieties, polymers, ligands, etc [2,3].

A facile solvothermal approach was used to synthesize stable ferrite nanoparticles as a simple and eco-friendly route, providing though products that exhibit high crystallinity in the presence of well-defined polymers and/or organic ligands. The hydrophobic MNPs converted to hydrophilic and the hyperthermic effects as well as relaxometric properties were studied and evaluated. Hydrophobic MFe_2O_4 nanoparticles coated with oleylamine (MFe_2O_4@OAm MNPs, where M = Co, Mn, Ni) with a similar shape and size (~9 nm) and magnetization values of 87.4, 63.1 and 55.0 emu g−1 for $CoFe_2O_4$@OAm, $MnFe_2O_4$@OAm and $NiFe_2O_4$@OAm, respectively, were successfully encapsulated into the hydrophobic cores of spherical micellar structures formed by the copolymers in an aqueous solution through a solvent mixing procedure [4,5].

Image

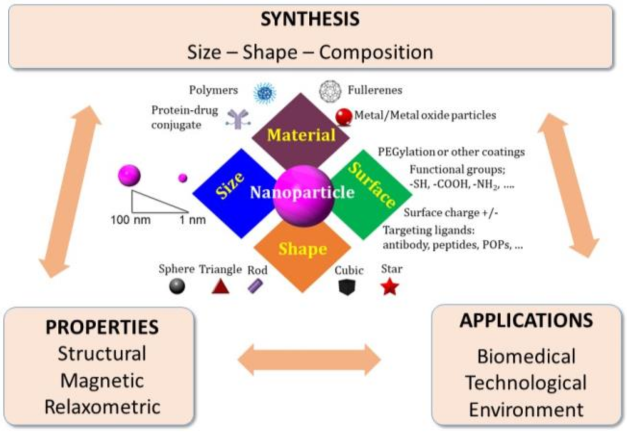

Figure 1: Schematic representation of the objectives of this project which includes the synthesis and the detailed characterizarion of the materials as well as the potentail applications of them in medicine, technology and environment.

Recent Publications (minimum 5)

[1] Caspani, S., Magalhães, R., Araújo, J. P., & Sousa, C. T. (2020). Materials 13 (11): 2586 (29 pp).
[2] Díez-Villares, S., Ramos-Docampo, M. A., da Silva-Candal, A., Hervella, P., J. Vázquez-Ríos, A., Dávila-Ibáñez, A. B., López-López, R., Iglesias-Rey, R., Salgueiriño, V., María de la Fuente (2021). Adv. Healthcare Mater.,10, 2101019
[3] Huynh, K., Baghdanian, A H., Baghdanian, A A., Sun, D S., Kolli, K.P., Zagoria, RJ. (2020). Emerg. Radiol.2020, 27, 115.
[4] Menelaou, M., Iatridi, Z., Tsougos, I., Vasiou, K., Dendrinou-Samara, C., & Bokias, G. (2015). Dalton Transactions 44: 10980.
[5] Menelaou, M., Georgoula, K., Simeonidis, K., & Dendrinou-Samara, C. (2014). Dalton Transactions 43: 3626.

Biography (150 word limit)

Melita Menelaou received her Diploma in Chemical Engineering (2004) and PhD degree (2009) from the Aristotle University of Thessaloniki (Greece). Dr Menelaou was a member of respected research groups in Asia (Japan – Advanced Institute of Materials Research) and Europe (Czechia – Central European Institute of Technology-Brno University of Technology; Spain – University of Barcelona; Greece – School of Chemical Engineering/School of Chemistry, Aristotle University of Thessaloniki). Currently, she is working in the Department of Chemical Engineering at Cyprus University of Technology. Her work focuses on the synthesis, characterization and application of a wide range of materials including nanomaterials, superconductors, and aerogels with technological and biomedical applications.

Contact Details:

Email: melita.menelaou@cut.ac.cy

Contact Number: 00357 25 00 2308
Linked In/twitter Account Id: Melita Menelaou
Facebook profile: Melita Menelaou
Session:
Presentation Category: Oral/poster/Video Presentation/E-Poster

Notes/Comments: