Θέματα Ερευνητικής μεθοδολογίας

1. Ανάπτυξη και σχεδιασμός συστημάτων μικροροών (microfluidics) για τη μελέτη συμπεριφοράς κυτταρικών ομάδων που δέχονται μηχανικά ερεθίσματα.
Development and design of microfluidic systems for the study of cell tissue behavior involved in mechanical stimuli.
Keywords: lab on a chip, microfluidics, cell cultures, cell stimulus and response, polydimethoxysiloxane, CFD analysis

- Ye Liu, E. Gill, Y. Y. S. Huang. Microfluidic on-chip biomimicry for 3D cell culture: a fit-for-purpose investigation from the end user standpoint. Future Sci. OA (2017) 3(2), FSO173.
- S. Kou, L. Pan, D. van Noort, G. Meng, X. Wua, H. Sun, J. Xu, I. Lee. A multishear microfluidic device for quantitative analysis of calcium dynamics in osteoblasts. Biochemical and Biophysical Research Communications 408 (2011) 350–355.
- Microfluidic Cell Culture Systems. C. Bettinger, J. T. Borenstein, S. L. Tao (Eds), Amsterdam, Elsevier, 2013.
- Microfluidics for Biological Applications. W.-C. Tian, E. Finehout (Eds), New York, Springer, 2008.

2. Υδροπηκτές στη ανάπτυξη βιοϋλικών και τεχνολογία Πυρηνικού Μαγνητικού Συντονισμού (NMR).
Hydrogel in the development of biomaterials through NMR technology.
Keywords: NMR, polymer synthesis, hydrogels, lattice architecture

- Guiseppi-Elie A1. Electroconductive hydrogels: synthesis, characterization and biomedical applications. Biomaterials. 31(10) (2010) 2701-16.
- Shi Z, Gao X, Ullah MW, Li S, Wang Q, Yang G. Electroconductive natural polymer-based hydrogels. Biomaterials. 111 (2016) 40-54.
- Kapoor S, Kundu SC. Silk protein-based hydrogels: Promising advanced materials for biomedical applications. Acta Biomater. 31 (2016) 17-32.
- Patrick McConville, Michael K. Whittaker, and James M. Pope. Water and Polymer Mobility in Hydrogel Biomaterials Quantified by 1H NMR: A Simple Model Describing Both T1 and T2 Relaxation. Macromolecules, 35(18) (2002) 6961–6969.

3. Ανάπτυξη δυαδικών υλικών γαλλίου με βιοδιαθέσιμα οργανικά υποστρώματα και διερεύνηση του βιολογικού ρόλου στην κυτταρική (παθο)φυσιολογία.
Development of binary materials of gallium with bioavailable organic substrates and investigation of their role in cellular (patho)physiology.
Keywords: cellular pathophysiology, binary materials, bioavailable organic substrates, gallium

- Mitchell G. Thompson, Vu Truong-Le, Yonas A. Alamneh, Chad C. Black, Jeff Anderl, Cary L. Honnold, Rebecca L. Pavlicek, Rania Abu-Taleb, Matthew C. Wise, Eric R. Hall, Eric J. Wagar, Eric Patzer, Daniel V. Zurawski
  Evaluation of Gallium Citrate Formulations against a Multidrug-Resistant Strain of Klebsiella pneumoniae in a Murine Wound Model of Infection. Antimicrob Agents Chemother. 59(10) (2015) 6484–6493.

- Seoung-ryoung Choi, Bradley E. Britigan, David M. Moran, Prabagaran Narayanasamy
  Gallium nanoparticles facilitate phagosome maturation and inhibit growth of virulent Mycobacterium tuberculosis in macrophages. PLoS One. 12(5) (2017) e0177987.
- Maher Y. Abdalla, Barbara L. Switzer, Christopher H. Goss, Moira L. Aitken, Pradeep K. Singh, Bradley E. Britigan
  Gallium Compounds Exhibit Potential as New Therapeutic Agents against Mycobacterium abscessus. Antimicrob Agents Chemother. 59(8) (2015) 4826–4834.
- Seied Mojtaba Valiahdi, Petra Heffeter, Michael A. Jakupec, Rodrig Marculescu, Walter Berger, Klemens Rappersberger, Bernhard K. Keppler. The gallium complex KP46 exerts strong activity against primary explanted melanoma cells and induces apoptosis in melanoma cell lines. Melanoma Res. 19(5) (2009) 283–293.

4. Μεταλλο-οργανικά υλικά (MOFs) λανθανιδίων στην ανάπτυξη τεχνολογίας διόδων εκπομπής φωτός (LEDs).
Lanthanide Metal Organic Framework (MOFs) materials in the development of LED technology.
Keywords: Metal organic frameworks, materials, LED technology, lanthanides

- Binbin Luo, Fei Li, Ke Xu, Yan Guo, Ying Liu, Zhiguo Xia and Jin Z. Zhang. B-Site doped lead halide perovskites: synthesis, band engineering, photophysics, and light emission applications. J. Mater. Chem. C. 7 (2019) 2781-2808.
- J. Rocha, L.D. Carlos, F.A. Almeida Paza and D. Ananias. Luminescent multifunctional lanthanides-based metal–organic frameworks. Chem Soc Rev. 40(2) (2011) 926-40.
- Bing Yan. Lanthanide-Functionalized Metal–Organic Framework Hybrid Systems To Create Multiple Luminescent Centers for Chemical Sensing. Acc. Chem. Res. 550(11) (2017) 2789–2798.
- Yan-Wu Zhao, Fu-Qiang Zhang, and Xian-Ming Zhang. Single Component Lanthanide Hybrids Based on Metal–Organic Framework for Near-Ultraviolet White Light LED. ACS Appl. Mater. Interfaces, 8(36) (2016) 24123–24130

5. Βιοϋλικά στην τεχνολογία τρισδιάστατης εκτύπωσης για την ανάπτυξη σκελετικών προσθετικών στην ορθοπεδική χειρουργική
3D printing biomaterials technology in the development of skeletal prosthetics in orthopedic surgery
Keywords: biomaterials, 3D printing, prosthetic replacements, orthopedic rectification, mechanical and biological properties

- Arabnejad S, Johnston B, Tanzer M, Pasini D. Fully porous 3D printed titanium femoral stem to reduce stress-shielding following total hip arthroplasty. J Orthop Res. 35(8) (2017) 1774-1783.
- Shen Y, Li X, Fu X, Wang W. A 3D finite element model to investigate prosthetic interface stresses of different posterior tibial slope. Knee Surg Sports Traumatol Arthrosc. 23(11) (2015) 3330-6.
- Devlin-Mullin A, Todd NM, Golrokhi Z, Geng H, Konerding MA, Ternan NG, Hunt JA, Potter RJ, Sutcliffe C, Jones E, Lee PD, Mitchell CA. Atomic Layer Deposition of a Silver Nanolayer on Advanced Titanium Orthopedic Implants Inhibits Bacterial

Colonization and Supports Vascularized de Novo Bone Ingrowth. Adv Healthc Mater. (2017) 6(11).
- Karthik Tappa and Udayabhanu Jammalamadaka. Novel Biomaterials Used in Medical 3D Printing Techniques. J. Funct. Biomater. 9(1) (2018) 17.

6. Τριαδικά μεταλλο-οργανικά υλικά βιογενών μεταλλοϊόντων με αντιοξειδωτικά φλαβονοειδή και φυσικά προϊόντα στην κυτταρική διαφοροποίηση στο Διαβήτη τύπου ΙΙ.
Ternary materials of biogenic metal ions with antioxidant flavonoids and natural products in cell differentiation in Diabetes mellitus II.
Keywords: antioxidant activity, metal-organic complex, flavonoids, natural product, adipogenesis, cell differentiation, Diabetes type II

- Ali, Y. Ma, J. Reynolds, J.P. Wise, S.E. Inzucchi, D.L. Katz. Chromium Picolinate for the Prevention of Type 2 Diabetes. Treat Strategies Diabetes 3(1) (2011) 34-40.
- E. Halevas, B. Mavroidi, M. Pelecanou, A. G. Hatzidimitriou. Structurally characterized zinc complexes of flavonoids chrysin and quercetin with antioxidant potential. Inorg. Chim. Acta 523 (2021) 120407.
- R. K. AL-Ishaq, M. Abotaleb, P. Kubatka, K. Kajo, and D. Büsselberg. Flavonoids and Their Anti-Diabetic Effects: Cellular Mechanisms and Effects to Improve Blood Sugar Levels. Biomolecules 9(9) (2019) 430.
- O. Tsave, M. Yavropoulou, M. Kafantari, C. Gabriel, J. Yovos, A. Salifoglou, The adipogenic potential of Cr(III). A molecular approach exemplifying metal-induced enhancement of insulin mimesis in diabetes mellitus II. J. Inorg. Biochem. **2016**, *163*, 323-331.

7. Σχεδιασμός και σύνθεση βιομαγνητικών νανοσωματιδίων ως φορέων φαρμάκων φυσιολογικής προέλευσης για αντιδιαβητική και αντικαρκινική θεραπεία.
Design and synthesis of magnetic nanoparticles as carriers of naturally occurring pharmaceuticals toward antidiabetic and anticarcinogenic therapeutics.
Keywords: magnetic nanocarriers, drug encapsulation-release, antidiabetic and anticarcinogenic drugs

- E R Flynn, H C Bryant. A biomagnetic system for in vivo cancer imaging. Phys Med Biol. 50(6) (2005) 1273–1293.
- Giulia Suarato, Seong-Il Lee, Weiyi Li, Sneha Rao, Tanvir Khan, Yizhi Meng, Maya Shelly. Micellar nanocomplexes for biomagnetic delivery of intracellular proteins to dictate axon formation during neuronal development. Biomaterials. 112 (2017) 176–191.
- Stuart C McBain, Humphrey HP Yiu, Jon Dobson. Magnetic nanoparticles for gene and drug delivery. Int J Nanomedicine. 3(2) (2008) 169–180.
- Andrew Z. Wang, Frank Gu, Liangfang Zhang, Juliana M. Chan, et al. Biofunctionalized Targeted Nanoparticles for Therapeutic Applications. Expert Opin Biol Ther. 8(8) (2008) 1063–1070.