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CiQUS Lecture



Multifunctional Stimuli-Responsive Systems for Sensing and Therapy

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More info: Research Group website

WEDNESDAY, April 6, 2022 12:15 p.m. CiQUS Seminar Room & Zoom Session

FONDO EUROPEO DE DESENVOLVEMENTO REXIONAL PO FEDER Galicia 2014-2020 – Unho moneiro de facer Europa

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Abstract:

Herein, the synthesis and application of nanostructured micro- and nanomaterials will be described with a special focus on the properties they could offer for medical applications (Figure 1).^[1,2] Examples will be given in which (i) particles-based sensors are applied for automated and precise quantification of organelle acidification^[3], (ii) for mapping pH changes in the local environment of 3D cell-seeded scaffolds,^[4] (iii) ECM-like magnetic nanofibers are realized as manipulative hyperthermia material and switchable drug release platforms.^[5]

References

[1] Optical and magnetic resonance imaging approaches for investigating the tumour microenvironment: state-of-the-art review future trends. Prasad S., Chandra A., Cavo M., Parasido E., Fricke S., Lee Y., D'Amone E., Gigli G., Albanese C., Rodriguez O., del Mercato L.L. Nanotechnology, 2021, 32, 062001.

[2] Electrospun nanofibers in cancer research: from engineering of in vitro 3D cancer models to therapy. Cavo M., Serio F., Kale N.R., D'Amone E., Gigli G., del Mercato L.L. Biomaterials Science, 2020, 8, 4887.

[3] A fully automated computational approach for precisely measuring organelle acidification with optical pH sensors. Chandra A., Prasad S., Alemanno F., De Luca M., Rizzo R., Romano R., Gigli G., Bucci C., Barra A., del Mercato L.L. ACS Applied Materials & Interface (2022, in press).

[4] Probing the pH microenvironment of mesenchymal stromal cell cultures on additive-manufactured scaffolds. Lorenzo Moldero, I., Chandra, A., Cavo, M., Mota, C., Kapsokalyvas, D., Gigli, G., Moroni, L., del Mercato, L.L. Small, 2020, 16, 2002258.

[5] Co-loading of Doxorubicin and Iron Oxide Nanocubes in Polycaprolactone Fibers for Combining Magneto-Thermal and Chemotherapeutic Effects on Cancer Cells. Serio F., Silvestri N., Kumar Avugadda S., Nucci G., Nitte S., D'Amone E., Onesto V., Gigli G., del Mercato L.L., Pellegrino T. Journal of Colloid And Interface Science, 2022, 607, 34.













Figure 1. Multifunctional stimuli-responsive systems for sensing and therapy.

The research leading to these results received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 759959, ERC-StG "INTERCELLMED").

Biosketch:

Loretta L. del Mercato (born in Naples, Italy, on August 7th, 1979) is Senior Researcher at the at the Institute of Nanotechnology of CNR (CNR NANOTEC) in Lecce (Italy) where she is Principal Investigator and Coordinator of the 3DCellSensing group. She received her Master Degree in Biotechnology from the University "Federico II" of Naples, Italy, in January 2004. In September 2007, she obtained her Ph.D. in Innovative Materials from Scuola Superiore ISUFI (Institute of Advanced Interdisciplinary Studies) under the supervision of Prof. R. Cingolani and Prof. R. Rinaldi. From January 2008 to April 2010, she was Post-Doc at the Phillips University of Marburg (Germany) in the Biophotonics Group of Prof. W.J. Parak. In May 2010, she moved as Junior Researcher to the Nanoscience Institute of CNR in Lecce (IT). In 2015, she joined the new-funded Nanotechnology Institute of Cnr as Principal Investigator where she started her own research program. In 2015, she was visiting scientist at the Institute for Technology-Inspired Regenerative Medicine (MERLN) Maastricht University (NL), in the group of Prof. L. Moroni. Her main research interests are in the field of smart nanostructured micro- and nanomaterials for medical applications. Her current research interests focus on the development of optical sensors for measuring the intracellular (endosomes and lsysosomes) and the extracellular concentration of key analytes (e.g., pH, oxygen) in invitro tumor models; development of stimuli-responsive (e.g., chemical, magnetic, light) systems for controlled delivery of anticancer therapies. She is unit leader of several projects, and she was awarded a European Research Council (ERC) Starting Grant in 2017 and a My First AIRC Grant in 2019, respectively.

She serves as Member of the "Supervisory board" of the Italian Ministry of University and Research (MUR) for Mission 4 (Education and Research) of the National Recovery and Resilience Plan (PNRR) and as grant evaluator of international funding programmes (EUTOPIA Science and Innovation Postdoctoral Program; Short Term Mobility of Cnr; National Science Centre Poland; REPRISE-MIUR; Research; Foundation Flanders-FWO). She is member of the supervisory board of the "TecnoMed Apulia - Technopole for precision medicine" (2000 mq open access research infrastructure at Nanotec-Cnr hosting fully equipped facilities for nanomaterial synthesis; biomaterial fabrication; flow cytometry; cell biology (class I and II); genome editing; molecular biology; confocal and super resolution live cell imaging).