SUPRALIFE NEWSLETTER #2, DECEMBER 2023

Dear SupraLife Friends and Colleagues,
Welcome to the second SupraLife's Newsletter!

IN THIS NUMBER:

INTERNATIONAL SYMPOSIA

The SupraLife consortium planned and organized a series of symposia in major international scientific conferences across the fields of chemistry and biomaterials science. The SupraLife team diligently orchestrated these symposia aiming to (i) learn from distinguished scientists in the field, (ii) foster the exchange of knowledge, know-how and expertise, (iii) encourage scientific collaborations, (iv) stimulate scientific discussions in the field and networking opportunities to contribute to the development of advanced supramolecular biomaterials for healthcare, and (v) introduce the goals and training activities of the SupraLife project to stimulate the engagement of the scientific community.

IUPAC|CHAINS 2023 | THE HAGUE, THE NETHERLANDS

We are excited to share our incredible experience at IUPAC|CHAINS 2023 held in The Hague, the Netherlands from 20-25th August 2023, where the world's largest congress across the chemical sciences unfolded and distinguished scientists and peers met. We could attend and learn from the nine plenary lecturers, as well as keynote lectures, oral communications and poster presented over the week. The week was truly fantastic, being fully packed by scientific insights and engaging discussions. João Borges (University of Aveiro, Portugal) and Roxanne Kieltyka (University of Leiden, the Netherlands) had the pleasure of chairing a stimulating *Focus Session/Symposium* on "Bringing Supramolecular Materials to Life" on August 21st. The session featured distinguished speakers in the supramolecular chemistry and supramolecular biomaterials fields. The keynote speakers were Tanja Weil (Max Planck Institute for Polymer Research, Mainz, Germany), Patricia Dankers (Eindhoven University of Technology (TU/e), the Netherlands) and Matthew Webber (University of Notre Dame, USA) who delivered fantastic lectures on diverse topics, including supramolecular materials design, self-assembling peptides, host-guest systems, cell-material interactions, and ECM-inspired supramolecular hydrogels. The symposium gathered a lot of interest and engagement by the scientific community, who contributed to the discussion turning it into a truly enriching symposium. We were also pleased to engage with E.W. "Bert" Meijer (TU/e, the Netherlands), who was in the audience and engaged with the organizers and invited speakers.

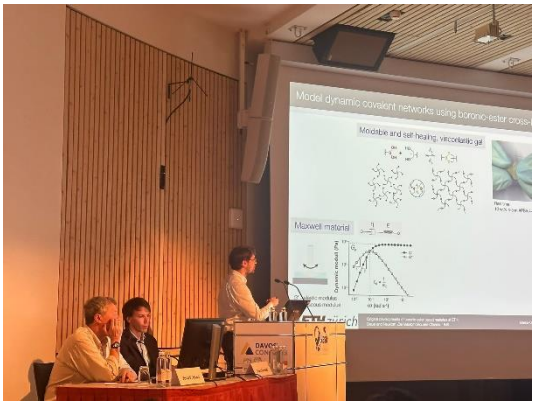
In addition, our group members, Vera Sousa and João Borges, PhD student and Senior Researcher at the University of Aveiro, respectively, showcased their research works, developed in the framework of SupraLife project, in two oral communications. Vera talked about the design and development of G-quadruplex-based supramolecular hydrogels as perfusable platforms for bioapplications in the 'Molecular Frontiers of Life'

session. On the other hand, João talked about the assembly of marine-origin polysaccharide-based multilayered systems as nanoreservoirs for sustained therapeutics delivery in the 'Biomaterials' session.
Both talks gathered a lot of attention from the audience and conducted to stimulating discussions. We would like to extend our gratitude to all attendees for their active participation and engagement, and insightful questions.

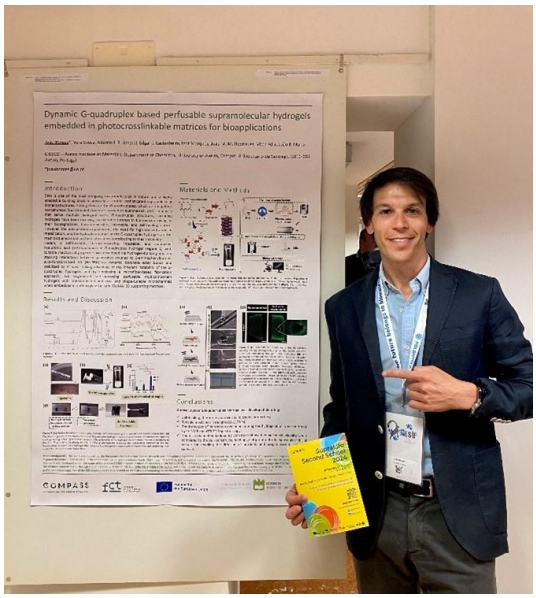
33RD ANNUAL CONFERENCE OF THE EUROPEAN SOCIETY FOR BIOMATERIALS (ESB 2023) | DAVOS, SWITZERLAND

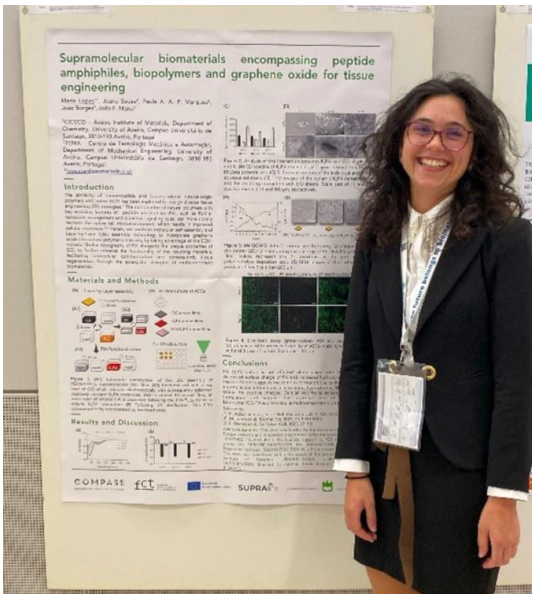
Reflecting on the remarkable experience at ESB 2023 in Davos, Switzerland, we are excited to share the highlights of this fantastic scientific conference which unveiled the latest discoveries on biomaterials science research for healthcare and was held amidst the stunning Swiss landscape from 4-8th September 2023. Our time exploring the surroundings was breathtaking, setting the stone for a week filled with engaging scientific insights and discussions, networking opportunities, and connections with both old and new friends.

João Borges and João F. Mano (University of Aveiro, Portugal) chaired a symposium on “Dynamic self-assembling biomaterials”, on September 5th, featuring an inspiring keynote lecture by Mark Tibbitt from ETH Zurich, Switzerland, on the “Macromolecular engineering dynamic biomaterials with reversible bonds”. Besides Mark’s lecture, the symposium was very diverse, including four shorter talks by PhD students, researchers and assistant professors from Europe, USA, Australia, and Asia on dynamic supramolecular hydrogels. Those included dynamic bioinspired self-assembling peptide hydrogels for targeted gene delivery, boronate-ester-based hydrogels for biomedical applications, and DNA-based materials towards adaptive biosensors. The fantastic attendance and lively engagement in our symposium, as well as throughout the whole conference, including in the plenary lectures and numerous keynotes, oral and poster presentations were truly inspiring. We took the chance to interact closely with several speakers working on supramolecular biomaterials, to introduce the SupraLife project, and to invite them to our upcoming events.



João Borges and Maria Lopes, Senior Researcher and PhD student at the University of Aveiro, respectively, delivered two poster presentations on research developed in the framework of the SupraLife project which were well-received. João introduced and explained the work on dynamic G-quadruplex hydrogels for biomedical applications and Maria presented her work on supramolecular biomaterials encompassing self-assembling peptide amphiphiles, natural macromolecules and graphene oxide for tissue engineering strategies. Both posters contributed to foster scientific exchanges and insightful discussions in the field.





Besides, the ESB 2023 organizing committee invited the chairs of symposia for a chairperson dinner at Höhenweg Mountain Restaurant, a magical place well above the Davos valley, were the participants strengthened ties and continued the scientific exchanges and discussions in an informal and relaxed environment.

The organizing committee also organized an invigorating run and walk around the Lake Davos, which counted on the active participation of numerous attendees, including Mark Tibbitt, João Borges and João F. Mano, fostering the exchange and networking among attendees while exercising themselves in the beautiful Alpes' scenario.

We would like to express our gratitude to the ESB 2023 conference chair Matteo D'Este and the whole organizing committee for orchestrating an outstanding scientific conference and enabling plenty of informal gatherings and networking opportunities among the participants. Davos was an unforgettable conference which inspired us and provided plenty of ideas. We look forward to continuing the exchange and sharing our future research endeavors with the biomaterials science community.

FIRST SCIENTIFIC RETREAT | DOURO REGION, PORTUGAL

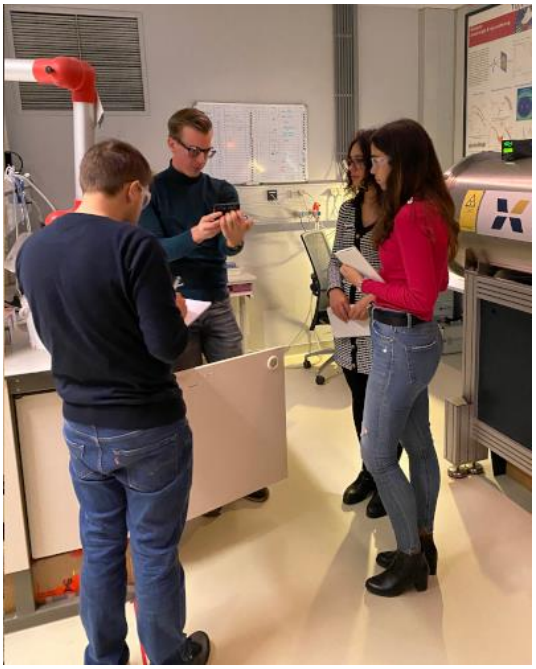
The first scientific retreat of the EU-funded SupraLife project was held in the Douro region, from September 29th to October 2nd, 2023. Entitled "Bonding across Borders", the scientific retreat brought together students and researchers from the University of Aveiro (UAVR, Portugal), Eindhoven University of Technology (TU/e, the Netherlands), University of Bordeaux (UBx, France) and its affiliated entities Polytechnic Institute of Bordeaux (Bordeaux INP) and French National Centre for Scientific Research (CNRS).

The meeting in Douro featured individual scientific talks and group presentations reuniting students and researchers from the different institutions of the SupraLife consortium, facilitating interdisciplinary interactions and fostering the creativity among the students and researchers from the different institutions. The retreat served as an unique platform to strengthening connections, sharing experiences, encouraging cross-disciplinary scientific discussions, and promoting collaborative research projects. Additionally, it provided an informal setting for stimulating scientific dialogue on advanced supramolecular biomaterials for healthcare. Our partners from TU/e, UBx, Bordeaux INP, and CNRS also had the chance to immerse themselves in the Portuguese culture amidst the picturesque Douro landscape.

HANDS-ON WORKSHOP | EINDHOVEN, THE NETHERLANDS

E.W. “Bert” Meijer and Patricia Dankers hosted a two-day cutting-edge workshop on the "synthesis and advanced characterization of functional supramolecular polymers" at the Institute for Complex Molecular Systems (ICMS) at the TU/e, in Eindhoven, the Netherlands, from 24-25th October 2023. The event featured top-level scientific lectures by experts in the supramolecular chemistry, supramolecular polymerization, nanosystems engineering, and supramolecular biomaterials fields, laboratory rotation schemes and demonstrations, and practical hands-on trainings on cutting-edge techniques to characterize functional supramolecular polymers and biomaterials. Those included optical microscopy techniques for particle tracking, high-resolution confocal microscopy to monitor the bottom-up assembly of coacervate artificial cells, spectroscopy techniques to study supramolecular systems, machine learning-based methods for aiding in the non-covalent synthesis of supramolecular polymers, and

artificial intelligence-driven innovative methods to screen supramolecular assemblies and enable advanced cell characterization.



The workshop catalyzed knowledge exchange, stimulated critical thinking, and ensured a high quality educational training to students and researchers from UAVR, UBx, Bordeaux INP and CNRS in supramolecular chemistry and supramolecular biomaterials for healthcare. The experience and feedback shared by the participants were fantastic. Everyone highlighted the inspirational lectures and the valuable learning experiences at the intersection of various scientific areas reuniting concepts of supramolecular chemistry, polymer chemistry, self-assembly, nanoengineering, biomaterials and cell biology. Collaborative research projects are currently ongoing aiming for the development of complex and dynamic supramolecular biomaterials for healthcare.

The workshop also included an exchange of experiences among the Research Support Offices and Technology Transfer Offices of the UAVR and TU/e from 24-25th October 2023, hosted by Gabriela Dima from TU/e. During this short-term visit, the participants exchanged on a variety of topics, including EU grants advice, project management, and legal/intellectual property rights. The meeting focused on exchanging best practices on research management, R&I proposal preparation, knowledge transfer, and intellectual property protection, boosting the translation of research outputs and innovation to society.

While in the Netherlands, João Borges took the chance to visit Roxanne Kieltyka's research group at the University of Leiden, the Netherlands, to exchange on collaborative research projects, to introduce the SupraLife project to the community, and to deliver a talk on the research work being developed in the framework of SupraLife.

UPCOMING CAPACITY BUILDING AND TRAINING ACTIVITIES

SUPRALIFE SECOND SCHOOL | AVEIRO, PORTUGAL

The upcoming SupraLife Second School themed "Bioinspired Supramolecular Self-Assemblies" will be held at the University of Aveiro, Portugal, from 10-15th March 2024.

This event offers an unique opportunity to showcase your work, engage with world-renowned speakers and peers, exchange ideas, and immerse yourself in a relaxed and collaborative atmosphere!
And… awards will be given to the best oral and the three best poster communications kindly sponsored by Metatissue and the Journal of Materials Chemistry B, Materials Advances and Biomaterials Science from the Royal Society of Chemistry (RSC), respectively.

The Second School will feature a fantastic **scientific program** from March 10-12th, including plenary/tutorial lectures by leading scientists in the field (please refer below for the scientific program speakers), along with oral and poster presentations by contributed abstracts on diverse topics, including bioinspired polymers, functional supramolecular self-assemblies, adaptive, responsive and interactive soft materials, compartmentalized structures and life-like materials/systems. These sessions will explore their applications in nanomedicine, drug/therapeutics delivery, diagnostics, theranostics, soft robotics, regenerative medicine, and other cutting-edge areas.

Additionally, from March 13-15th, the SupraLife Second School will host a **soft transferable skills' training program** aimed at broadening the career perspectives and enhancing the professional development of students and early-career scientists. The training sessions will include the following topics: Career routes; Scientific

publishing and ethics; CV writing for academia *vs.* industry; Mental health and imposter phenomenon in academia; Diversity, equity and inclusion; Community building for scientists; Science innovation; Open science; Project management, and Data management.

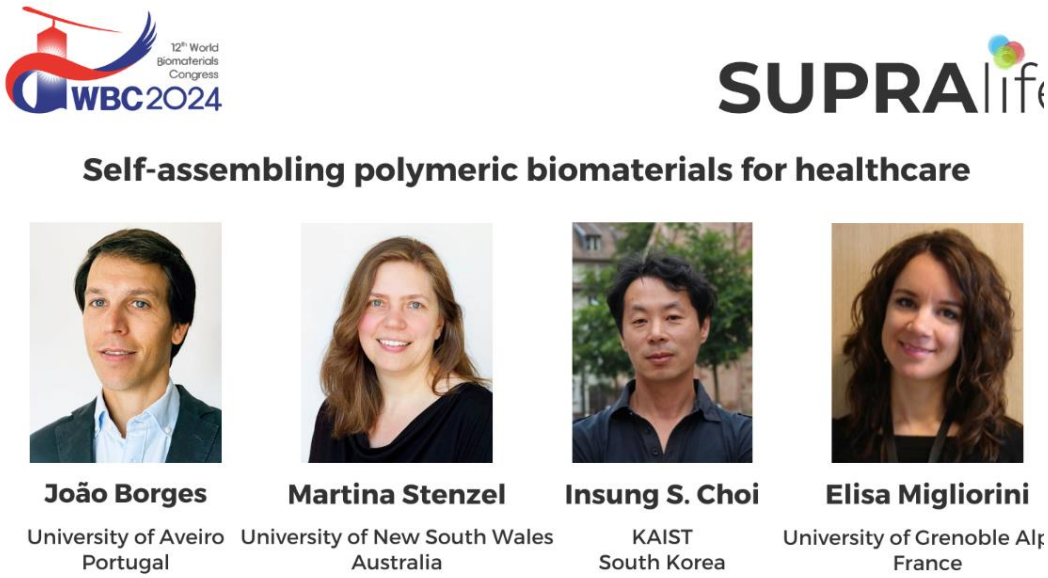
Do not miss this unique opportunity to engage, exchange ideas and learn from internationally-leading speakers and network with peers.

We are looking forward to meeting you in the pleasant city of Aveiro, Portugal, in March 2024!

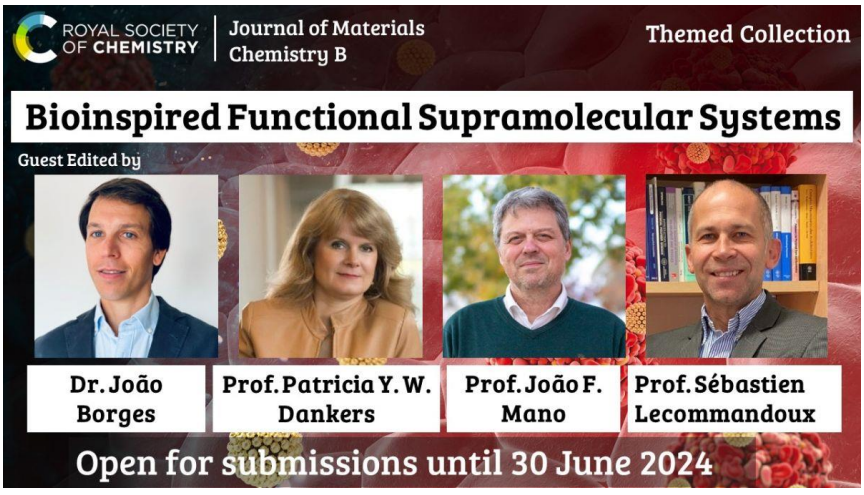
INTERNATIONAL SYMPOSIUM AT THE 12TH WORLD BIOMATERIALS CONGRESS (WBC 2024) | DAEGU, REPUBLIC OF KOREA

Join us at the 12th World Biomaterials Congress (WBC 2024) the largest biomaterials' conference in the world to be held in Daegu, Republic of Korea, from May 26th to 31st 2024, for our international symposium on "self-assembling polymeric biomaterials for healthcare". Chaired by João F. Mano (University of Aveiro, Portugal) and Jeroen Leijten (University of Twente, the Netherlands), the symposium will feature João Borges (University of Aveiro, Portugal) as the keynote speaker and Martina Stenzel

(University of New South Wales, Australia), Insung S. Choi (Korea Advanced Institute of Science and Technology, Republic of Korea) and Elisa Migliorini (University of Grenoble Alpes, France) as invited speakers. Join us to learn and explore the latest advancements in self-assembled polymeric biomaterials in the form of biomimetic nanostructured multilayered films, dynamic supramolecular hydrogels and glycopolymer-based nanoparticles for 3D cell culture, drug/protein/therapeutics delivery, tissue engineering and regenerative medicine. We look forward to meeting you in Daegu, South Korea, next May 2024!



THEMED COLLECTION ON *BIOINSPIRED FUNCTIONAL SUPRAMOLECULAR SYSTEMS* | JOURNAL OF MATERIALS CHEMISTRY B



The SupraLife consortium members João Borges (University of Aveiro, Portugal), Patricia Y. W. Dankers (Eindhoven University of Technology, the Netherlands), João F. Mano (University of Aveiro, Portugal), and Sébastien Lecommandoux (University of Bordeaux, France) are Guest Editors of the themed collection *Bioinspired Functional Supramolecular Systems* to be published in the *Journal of Materials Chemistry B* from the RSC.

This collection aims to share the latest developments in the fascinating field of the bioinspired supramolecular systems from the fundamentals on the supramolecular design and synthesis to their application in drug/gene/protein/therapeutics/cell delivery, biosensing, diagnostics, theranostics, tissue engineering, regenerative medicine, among others.

Find out more about this collection and how to submit your paper here: https://blogs.rsc.org/jm/2023/12/14/submit-to-our-latest-journal-of-materials-chemistry-b-collection-on-bioinspired-functional-supramolecular-systems/

We welcome and encourage the submission of articles in the form of full papers, communications, reviews and perspective articles until **30th June 2024**!

PUBLICATIONS

- João Borges, Xi Qiu Liu, Hao Chang, Jinfeng Zeng, Claire Monge, Charlotte Garot, Ke-feng Ren, Nihal Engin Vrana, Philippe Lavalle, Takami Akagi, Michiya Matsusaki*, Mitsuru Akashi*, João F. Mano*, Jian Ji*, Varvara Gribova*, Catherine Picart*, Recent Developments in Layer-by-Layer Assembly for Drug Delivery and Tissue Engineering Applications, *Advanced Healthcare Materials* **2023**, 2302713. DOI: 10.1002/adhm.202302713 (Open Access).
- José Almeida-Pinto, Matilde R. Lagarto, Pedro Lavrador, João F. Mano*, Vítor M. Gaspar*, Cell Surface Engineering Tools for Programming Living Assemblies, *Advanced Science* **2023**, *10*, 2304040. DOI: 10.1002/advs.202304040 (Open Access).

- Maria C. Gomes, Ana Rita Pinho, Catarina Custódio, João F. Mano*, Self-Assembly of Platelet Lysates Proteins into Microparticles by Unnatural Disulfide Bonds for Bottom-up Tissue Engineering, *Advanced Materials* **2023**, *35*, 2304659. DOI: 10.1002/adma.202304659.
- Cristiana F. V. Sousa, Luís P. G. Monteiro, João M. M. Rodrigues, João Borges*, João F. Mano*, Marine-origin polysaccharides-based free-standing multilayered membranes as sustainable nanoreservoirs for controlled drug delivery, *Journal of Materials Chemistry B* **2023**, *11*, 6671–6684. DOI: 10.1039/D3TB00796K (Open Access).
- Vera Sousa, Adérito J. R. Amaral, Edgar J. Castanheira, Igor Marques, João M. M. Rodrigues, Vítor Félix, João Borges*, João F. Mano*, Self-Supporting Hyaluronic Acid-Functionalized G-Quadruplex-Based Perfusable Multicomponent Hydrogels Embedded in Photo-Cross-Linkable Matrices for Bioapplications, *Biomacromolecules* **2023**, *24*, 3380–3396. DOI: 10.1021/acs.biomac.3c00433 (Open Access).
- Maria Lopes, Marília Torrado, Daryl Barth, Sofia D. Santos, Melike Sever-Bahcekapili, Ayse B. Tekinay, Mustafa O. Guler, Franck Cleymand, Ana P. Pêgo, João Borges*, João F. Mano*, Supramolecular presentation of bioinstructive peptides on soft multilayered nanobiomaterials stimulates neurite outgrowth, *Biomaterials Science* **2023**, *11*, 5012–5024. DOI: 10.1039/D3BM00438D (Open Access).
- Pedro M.S. Ouro, Dora C.S. Costa*, Adérito J.R. Amaral, João F. Mano*, A Supramolecular Injectable Methacryloyl Chitosan-Tricine-Based Hydrogel with 3D Printing Potential for Tissue Engineering Applications, *Macromolecular Bioscience* **2023**, 2300058. DOI: 10.1002/mabi.202300058.

The SupraLife team wishes you Happy Holidays and a SUPRA New Year 2024!!!

Funded by
the European Union

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No. 101079482. The content of this newsletter reflects the views and opinions of the authors only and does not necessarily reflect those of the European Union or the European Research Executive Agency. Neither the European Union nor the European Research Executive Agency can be held responsible for them or for any use which may be made of the information contained therein.

CONNECT WITH US!

Our mailing address is:

SupraLife

CICECO - Aveiro Institute of Materials, Department of Chemistry

University of Aveiro, Campus Universitário de Santiago

Aveiro 3810-193

Portugal