

STORM-BOTS

**Soft and Tangible Organic
Responsive Materials progressing
roBOTic functionS**



This project has received funding from the European Union's Horizon2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 956150

**ISSUE 2
JANUARY 2023**

Contents

| | |
|--|-----------|
| EDITORIAL | 2 |
| WHAT HAS HAPPENED SO FAR | 3 |
| MEETINGS AND NETWORK-WIDE TRAINING ACTIVITIES | 3 |
| OTHER TRAINING ACTIVITIES | 5 |
| COMMUNICATON & OUTREACH ACTIVITIES | 7 |
| PUBLICATIONS AND CONFERENCES | 9 |
| NETWORK UPDATES | 10 |
| UPCOMING EVENTS | 12 |

Editorial

Dear reader,

On behalf of the STORM-BOTS members, I'm pleased to introduce you to the second issue of our newsletter. We have just finished the second year of our project and it has been marked with important events such as the symposia, including the first in-person meeting at Cambridge, UK, and the Mid-Term check meeting.

Our Early-Stage Researchers are now fully immersed in their research projects and actively participating in all the training activities organised locally and at a network level. This is reflected in their presentations at the symposia, but also in their participation in conferences and publications that are now starting to flourish. It is also great that secondments are already taking place. They are a great opportunity for ESRs to get involved in collaboration with other members of the network, and to get enriched with different research ideas and teams.

We have also received fantastic news in the form of prizes and projects funded to members of our consortium. There are some lines dedicated to this fantastic news in this issue. Congratulations to everyone!

With the start of the third year of the project, we look forward to continuing with the training activities and the research collaboration, and to meeting at the next events.



Carlos Sánchez Somolinos & Elena Atrián Blasco
Coordination and Management Team
Spanish National Research Council - CSIC

What has happened so far

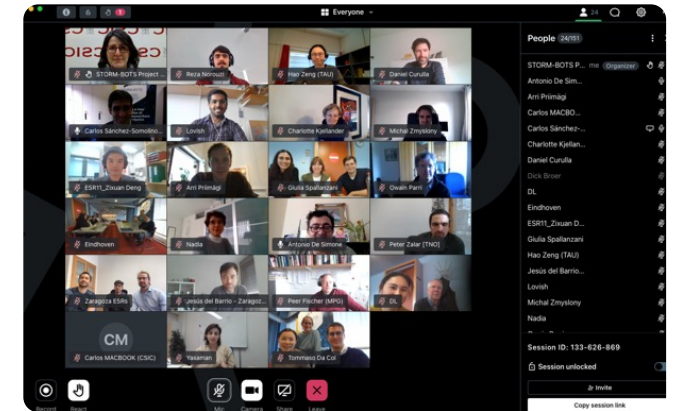
Consortium meeting

On the 21st of January 2022, the first consortium meeting joined by STORM-BOTS ESRs took place. It was a great opportunity to meet everyone and to get to know the project, the activities carried out until that moment and the future ones.



1st STORM-BOTS symposium – CSIC

The first Network-wide training activity, organised by CSIC, successfully took place from the 23rd to the 25th of February 2022. The meeting gathered all STORM-BOTS members and served as an opportunity to meet the ESRs and their projects. The symposium was structured in two segments. The internal part was dedicated to training sessions for project members only, such as presentations of the ESRs and meetings with the ESR Supervisory Teams. The open part, available for external participants too, offered lectures and courses on different aspects of Liquid Crystal (LC)-based soft robotics research as well as transversal skills of high relevance to scientific research, all of them given by renowned invited speakers and members of the STORM-BOTS consortium. They were three intense and fruitful days for the ESRs and all the Network members, with high-quality training for the ESRs and all attendants of the lectures.



What has happened so far

Mid-term check meeting

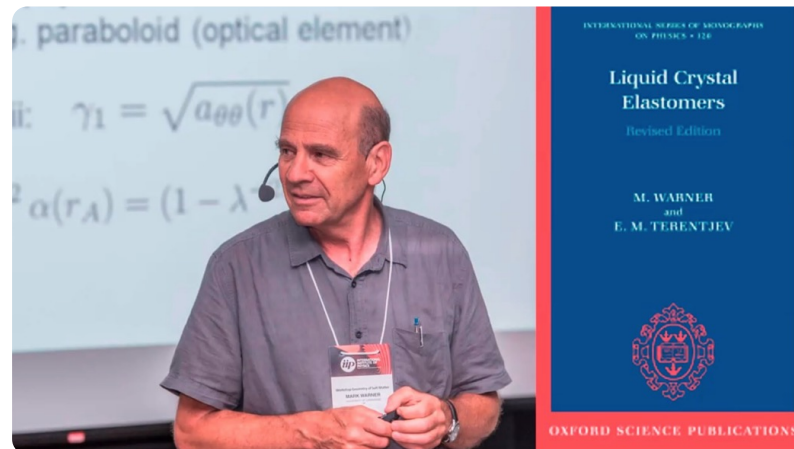
The Mid-Term Check Meeting of STORM-BOTS was held online on April 20th, 2022 (month 16 of the project). STORM-BOTS partners and ESRs met with the REA Project Officer (PO) to share the progress of the first year and establish a constructive dialogue among all participants. The PO informed on the different project development issues, reminding fellows and hosts of their rights and obligations. The recruitment process and the progress of the project were also assessed. The meeting resulted in very successful feedback for everyone and a boost to keep up the good work.



2nd STORM-BOTS symposium – UCam

The second Network-wide training activity, organised by the University of Cambridge, took place from the 5th to the 8th of September at Corpus Christi College in Cambridge, UK. This symposium was a significant event mainly for two reasons: it was celebrated in memory of Prof Mark Warner, FRS, and it was the first in-person STORM-BOTS Network-wide event. This symposium, which was organised as a hybrid event, included lectures and courses on the theory of Liquid Crystal Elastomers, Digital Science and

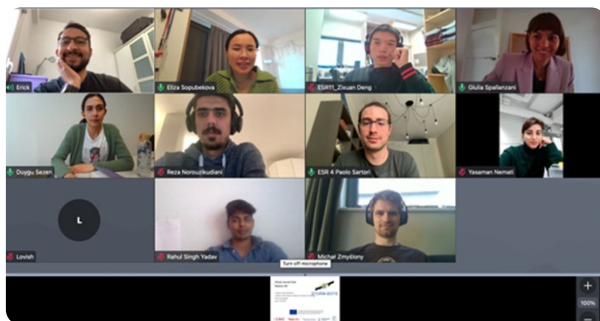
Computational Tools for Soft Robotics. Different workshops on Science Communication and Dissemination were also offered to ESRs and all participants. ESRs also had the opportunity to present their research to all the members of the Network, and to get constructive feedback from the ESR Supervisory Teams (ESTs). On the last day, we enjoyed a joint session on Liquid Crystals (LC) and LC Elastomers celebrated in memory of Prof Mark Warner and co-organised with the 6th Edwards Symposium.



Other training activities

Virtual Journal Club

The STORM-BOTS Virtual Journal Club started in April as a monthly activity in which ESRs present and discuss a scientific article of their choice. This activity looks at improving their communication and networking skills, staying up-to-date with the literature and developing a critical thinking mindset in research.



Screenshots of VJC sessions

How do you think the VJC contributes to your training?

“The VJC is a great training activity where we keep each other updated about the different research areas related to LCEs. Besides, these scientific discussions provide us with a nice platform to get inputs related to our project from other ESRs.” (Lovish, ESR-5)



“The VJC aids in developing our critical thinking, in the sense that we have to present the selected article in a way that it can be explained to the other ESRs in a short time, but still deep enough to spark the conversation around it.” (Erick, ESR-3)



How has been the experience of organising the VJC so far?

“Organising a VJC meeting can improve our management skills, including planning, scheduling and starting the meeting. Sometimes it can be a bit challenging to choose an article that interests everyone.” (Reza, ESR-6)



“Organizing the VJC has been a good exercise on how to communicate research ideas, as we have to cover all aspects of a presentation, from technical to dissemination skills. As well, it has been a way to encourage the discussion around our selected articles and projects.” (Erick, ESR-3)

What did you like the most about participating and presenting at the VJC?

“To learn about some of the recent applications of LCEs, which gave me some ideas to consider in my future modelling. I also learned a lot from the discussion between ESRs.” (Reza, ESR-6) “It is always great to know about the perspective of other researchers on different scientific topics.” (Lovish, ESR-5)

Other training activities

Secondments

Secondments are an important part of the ESRs training. Through secondments, ESRs get experience from different disciplines and sectors to those of their main research project. Secondments not only help enrich their scientific projects but also their careers, widening their network and transversal skills, and boosting the scientific collaboration among partners.

How do you think the secondment contributes to your training?

“During Secondments, you get the opportunity to learn and develop expertise which differs from what your host institution can provide you with. For I just begun one of my secondments, I just had a taste of this experience, but I can already say it is very helpful.” (Giulia, ESR-12)



“The secondment at UZ contributed to my training due to the high content of chemistry, in which I just had the basic courses during my bachelor's and masters' degrees, and helped me to better understand my material, how and why it works the way it does.” (Paolo, ESR-4)



How has been/is being the experience at your secondment?

“My secondment in John Biggins' group in the University of Cambridge provided me with a deeper understanding of the physics behind the actuation of my Liquid Crystal device.” (Duygu, ESR-9)

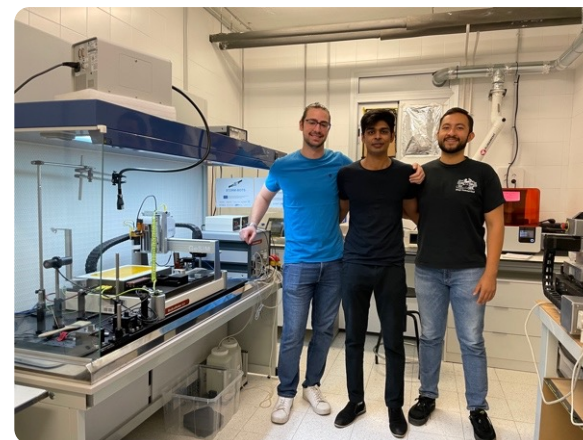


“The experience has been nice, both Jesús del Barrio and Rahul have been very helpful, for both the theoretical and practical part of the secondment.” (Paolo, ESR-4)

What have you enjoyed the most about your secondment or the research done during your secondment?

“Firstly, I enjoyed meeting people with different backgrounds and expertise whom I believe can contribute to your knowledge with pieces of the puzzle otherwise more complicated to find, that perhaps can result in collaborations or friendships. Secondly, I really liked the way the secondment can adapt to your PhD project.” (Giulia, ESR-12)

“I enjoyed the discussions with John's group members and learning about the theory of Liquid Crystal Elastomers the most. It was a very insightful experience.” (Duygu, ESR-9)



Communication & Outreach activities

Smart photonic materials group on Finnish TV

The research work on soft robotics and on “actuators that learn”, carried out in the Smart Photonic Materials group (Tampere University), was featured in the evening program of the National Finnish TV “Puoli seitsemän” on January 18, 2022. Click [here](#) to see the clip.



Press conference CSIC

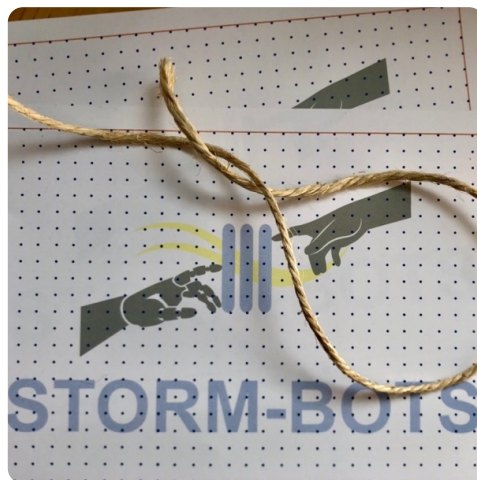
STORM-BOTS was publicly presented in a press conference organised by CSIC Aragón on February 22nd, 2022. Carlos Sánchez-Somolinos, the STORM-BOTS coordinator, introduced the project accompanied by the President of the Aragonese Parliament, Javier Sada and the Delegate of CSIC in Aragón, María Jesús Lázaro, among other representatives of the regional government and research institutions. Different media channels covered the press conference.



Dissemination activities

European Researchers' Night 2022

Last September, STORM-BOTS was also present at the European Researchers' Night! Rahul (ESR-2, UZ), Erick (ESR-3, CSIC) and Paolo (ESR-4, CSIC) showed their research on Liquid Crystal Elastomers and 4D printing to the public of the ERN'22 in Zaragoza. Looking forward already to next year's edition!

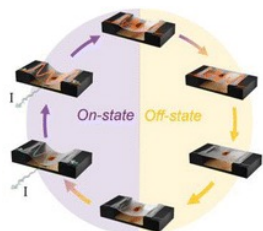


Lab visit CSIC

ESRs at CSIC, Erick (ESR-3) and Paolo (ESR-4), offered a lab visit to high school students in March 2022. They shared their background and training, and how they became researchers of a Marie Skłodowska-Curie action as STORM-BOTS. The students also visited the lab and could see the day-to-day research work carried out by Erick and Paolo.

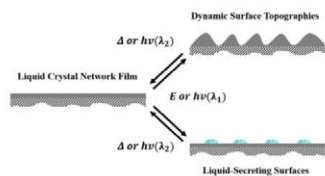
Publications and conferences

Several papers have been published by our ESRs during the second year of STORM-BOTS. Follow the links for further information.



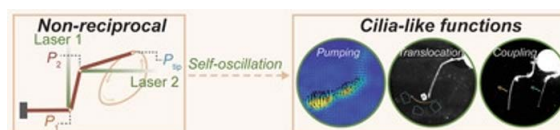
Self-regulating electrical rhythms with liquid crystal oligomer networks in hybrid circuitry. Mert O. Astam, Pengrong Lyu, Jacques Peixoto and Danqing Liu

Soft Matter, 2022, 18, 7236-7244
<https://doi.org/10.1039/D2SM01117D>



Active Surfaces Formed in Liquid Crystal Polymer Networks. Mert O. Astam, Yuanyuan Zhan, Thierry K. Slot and Danqing Liu.

Applied Materials and Interfaces, 2022, 14, 22697-22705
<https://pubs.acs.org/doi/pdf/10.1021/acsami.1c21024>



Light-fueled non-reciprocal self-oscillators for fluidic transportation and coupling. Zixuan Deng, Hang Zhang, Arri Priimagi and Hao Zeng.

Advanced Materials, 2023, 2209683
<https://doi.org/10.1002/adma.202209683>



Robotic Pick-and-Place Operations in Multifunctional Liquid Crystal Elastomers. Pengrong Lyu, Mert Orhan Astam, Carlos Sánchez-Somolinos, Danqing Liu.

Advanced Intelligent Systems, 2022, 4, 2200280
<https://doi.org/10.1002/aisy.202200280>

ESRs have also participated at different conferences, presenting posters or oral communications

Zixuan (ESR-11)
 1st LIBER symposium
 Espoo, Finland
<https://www.aalto.fi/en/events/liber-symposium-2022>

Reza (ESR-6)
 2022 International Workshop on Multiscale Innovative Materials and Structures (MIMS22)
 Cetara, Italy
<https://www.multiscale.unisa.it/>

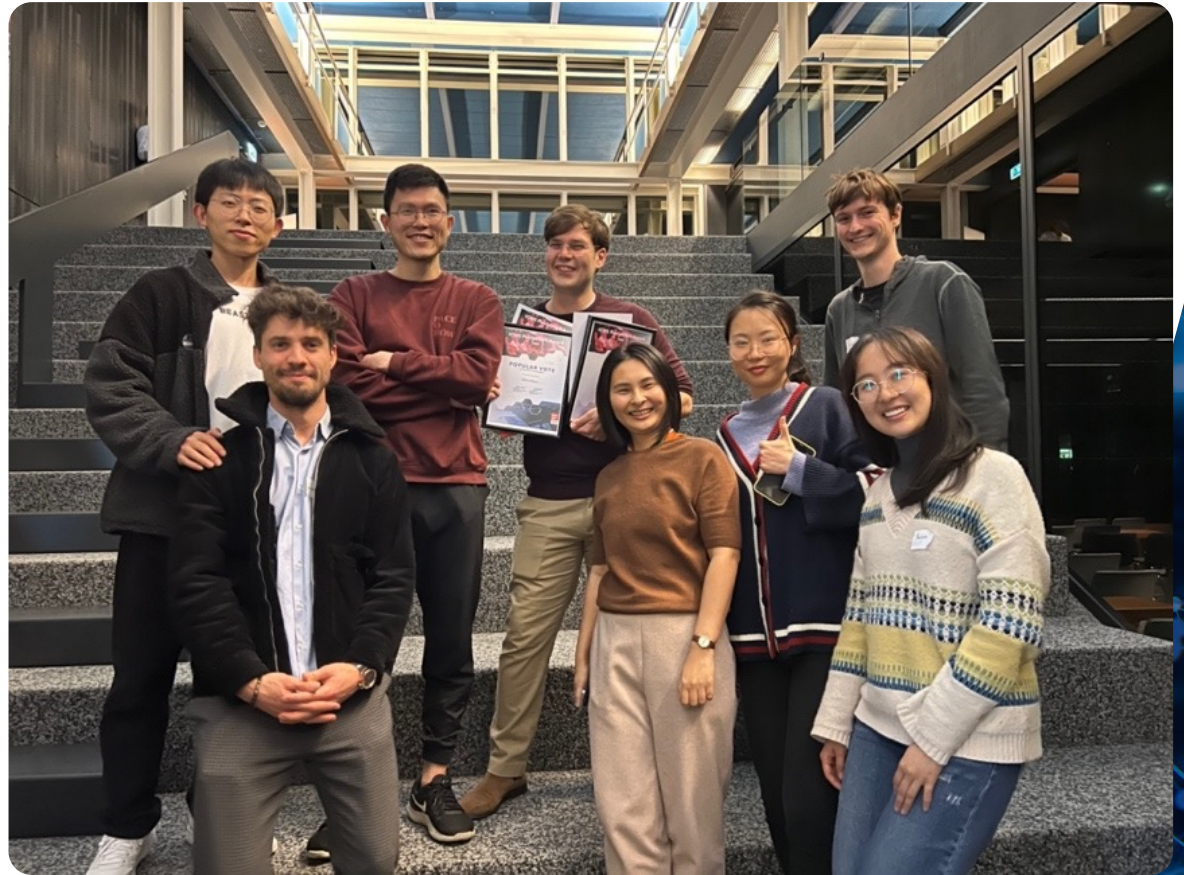


Michał (ESR-7)
 2022 Division C Graduate Conference
 Cambridge, UK

Network updates

Mert (ESR-8) wins the 3rd ICMS PhD Publication Award

Among the 5 finalists, Mert (ESR-8) was awarded with the 3rd ICMS PhD Publication prize for his first author paper titled: “Self-regulating electrical rhythms with liquid crystal oligomer networks in hybrid circuitry”, published in the journal *Soft Matter* in 2022. Mert gave a pitch presentation to present his work at the competition and won also the prize to Most Popular Pitch vote from the public. Congratulations, Mert!



Network updates

ERC-funded projects

Three STORM-BOTS members have received funding from the ERC this year. It is a recognition of the excellent research they carry out and a great opportunity for STORM-BOTS ESRs to learn and be in contact with the most innovative science. Here is some more info on the awardees and their projects.



European Research Council

Established by the European Commission

**Alessandro Lucantonio (SSSA)
StG ALPS**



AI-based Learning for Physical Simulation

The project ALPS - AI-based Learning for Physical Simulation aims to devise algorithms that are capable of building mathematical models of physical systems starting from experimental data. The proposed approach combines equation-based modelling and machine learning techniques to produce intelligible models with better generalization capabilities with respect to purely data-driven ones. The general-purpose methods and algorithms developed in this project will contribute to answering the increasing demands for accurate models of complex systems in science and engineering.

**Hao Zeng (TAU)
StG ONLINE**



From light fueled self-oscillators to light communicating material networks

In a biological context, communication refers to the interactive behaviour of one organism affecting the current or future behaviour of another. In the context of bioinspired materials, ONLINE will develop life-like material structures that communicate with each other via physical contact, fluidic medium, or optical beams. The core concept behind the communicative materials is self-oscillatory (self-sustained) motions in light-responsive liquid crystal elastomers. The project will scale down the self-oscillator concepts to the micro-scale and realize soft material robots that can communicate.

**Arri Priimägi (TAU)
CoG MULTIMODAL**



Multimodal Sensory-Motorized Material Systems

The MULTIMODAL project aims at developing new materials with autonomous and interactive features by taking inspiration from biological sensory-motor interactions. These sensory-motorized materials will be composed of shape-changing liquid crystal networks responsive to photochemical, (photo)thermal and humidity-triggered activations. These materials will be “trained” to strengthen upon repetitive action and to mechanically adapt to different environments. Advanced robotic functionalities of these materials are expected enabling to take inanimate, shape-changing materials closer to motor functions of living species.

Upcoming Events

For the third year of STORM-BOTS there will be many more activities focused on the training of ESRs.

Two network-wide training events are planned for 2023. In February, the Boot-camp organised by SSSA will take place at the [BioRobotics Institute](#) in Pisa, Italy. At this Boot-camp, all STORM-BOTS fellows will have a direct impression of the different research topics pursued in this Centre and learn different developments in fields such as surgical robots and soft robotics. They will also obtain valuable feedback on their projects. The 3rd STORM-BOTS Symposium will be organised by TAU in September 2023, focused on training on soft robotic functions.

Local activities such as training and outreach will also continue. ESRs will continue to train on Experimental Design and Data Analysis with the Voucher Scheme offered by ViD.

The secondments will take special relevance for the ESRs and their projects during the next year. Secondments will also help ESRs to implement the Job Shadowing Programme and to learn from different sectors and disciplines.

At the middle point of their scientific projects, publications and presentations at international conferences will be of most importance in the following year.

- **Boot-camp**
- **3rd STORM-BOTS symposium**
- **Secondments**
- **Voucher Scheme for Experimental Design and Data Analysis**
- **Job Shadowing Programme**
- **Scientific publications**
- **International Conferences**



 [LinkedIn](#)

 [Twitter](#)

 [Instagram](#)

 [storm-bots.eu](#)

Beneficiaries



Partner Organisations

