

IET International Travel Award 2024

Miaomiao Zou, University of Cambridge

2024 Materials Research Society Spring Meeting & Exhibit, Seattle, US

I am delighted to be able to write a conference travel report to share my amazing experience at the Materials Research Society (MRS) conference 2024. Even though the conference has been over for a week, the excitement of attending has remained. All thanks to the fantastic support from the IET International Travel Awards!

MRS is the most international, prestigious, and wide scope of coverage advanced materials forum with a huge impact in the world, attracting loads of visionary scientists to share their professional interests and advancement in interdisciplinary materials field, including physics, chemistry, biology, mathematics, and engineering. Attending MRS is a dream of many PhD's studying the materials field. As a PhD student focusing on additive manufacturing and materials, I mainly attended the symposium "MF01: Advances in Polymer-based Soft Matter for Additive Manufacturing" and also waded into a few other symposiums in Sustainable Polymers and Applications, and Biohybrid Materials and Medical Devices for Sensing, Robotics, and Energy.

My oral presentation was mainly about "Responsive 3D Printed Composites for Protective Applications", which started from "Silly-Putty", a shear-stiffening gel whose modulus is significantly increased upon rapid impact. They have applications in protective and other devices but are generally limited by difficult processability and poor shape retention. Thus, I demonstrated a simple and scalable process for making elastic shear-stiffening composites with locally controllable and complex geometries. I constructed elastic shear-stiffening composites combining mechanical integrity with shear-stiffening behaviour and elasticity. Shear-stiffening gels were 3D-printed as thin fibres with interstitial spaces filled with polydimethylsiloxane elastomer to hold the gels in place. The composite exhibited strong impact-resistance and shape recovery, which may be due to synergistic energy absorption and dissipation at the composite interface, as well as to the elastomer architecture. Composite mechanics can also be locally modulated by tuning the infill percentages to selectively vary part stiffness and therefore aid motion and wearer comfort. Similarly, a composite hinge exhibits excellent damping, shown in a robotic demonstration. In particular, I highly recommended my design of a 3D printer, which aroused a great deal of interest from the audience who talked to me further when I finished the presentation.

This conference also provides a perfect platform to cooperate and exchange ideas across all scientific disciplines. It is incredible that a PhD from WU presented a similar method to manufacture interesting mechanical structures, which I also used in my first year. With further discussion, both of us felt our research methods are similar, but each has its own distinctive characteristics. It is amazing to approach the same problem but have different ideas! At the same time, the skills we specialise in are still different, so we can say that we complement each other's strengths, which makes it possible for us to find ways to work together. All in all, this experience was amazing.

MRS brought scientists together doing similar fields. It was unbelievable that I even met my alumna from the University of Cambridge, who is now an assistant professor at Nanyang Technological University and doing similar research to me. It was so nice that we talked a lot about PhD experience and career development, so thankful for this! Also, I met new friends who are from UIUC and Stanford Uni in the symposium networking event, which was so nice to talk to my peers about research work and share our real thoughts and feelings as PhD students, a huge relief. Also, more communications were made with the session chairs and other PhD students to discuss research methods and interesting applications. All these inspired my research ideas and career plans for the future.

What made it memorable for me was that there were so many excellent presentations I wanted to hear! Especially, I was blown away by the keynote presentation from Prof Zhenan Bao, an extremely talented female materials scientist. I was deeply captivated by her presentation and she even became my academic idol. After her presentation, I asked questions about the feasibility of combining her research with 3D printing, which is my specialty. Other presentations from high-academic-reputation professors, like Prof John A. Rogers (Northwestern University) and Prof Xuanhe Zhao (MIT), were also very inspiring.

It was the first time during my PhD that I went to an international conference and gave an oral presentation, so the conference was really memorable. I would like to express my sincere gratitude to IET again for providing so kind financial support to a 5-day conference travel in Seattle. Without this traveling grant, I would most likely not have been able to attend the conference, which would have been a great pity for me. Luckily, finally I made it. Thus, I highly recommend and encourage young researchers and PhD students to apply for the IET Travel Award to support you on a broader world stage, which will absolutely bring you great inspiration for your research and career!



2024 MRS[®] SPRING MEETING & EXHIBIT

April 22-26, 2024 | Seattle, Washington • May 7-9, 2024 | Virtual

May 2, 2024

Miaomiao Zou

University of Cambridge

Presented the abstract below at the 2024 MRS Spring Meeting and Exhibit:

Control ID: 4007027

Final ID: MF01.10.03

Abstract Title: Responsive 3D Printed Composites for Protective Applications

Symposium: MF01: Advances in Polymer-based Soft Matter for Additive Manufacturing

Date: Wednesday, April 24, 2024

Eileen Kiley
Director of Programs
Materials Research Society

MATERIALS RESEARCH SOCIETY[®]

506 Keystone Drive | Warrendale, PA, 15086-7537, USA | mrs.org



