The Institution of Engineering and Technology

From 27th to 31st October 2024, I attended the 2024 American Institute of Chemical Engineers (AIChE) Annual Meeting in San Diego, California, US. This prestigious conference is the premier platform uniting >5000 academic and industrial researchers from >50 countries to discuss cutting-edge topics in chemical engineering. With over 760 sessions and 6,000 papers, the conference covered a wide spectrum of fields, including separations, catalysis, particle technology, process systems engineering, energy, materials, and pharmaceuticals. Notably, it featured over 110 related sessions on interdisciplinary topics in bioengineering.

I delivered a talk, titled "*Extracellular Matrix-Inspired 3D Microprinted Tumour Microenvironment Models*", as part of the session "*Engineered Biomimetic Tissue Models III: Microenvironmental Control for Biomimetic Models*". My presentation highlighted my work on designing 3D printed scaffolds to model the tumour microenvironment (TME). This research is part of a \$25 million Cancer Grand Challenges (CGC) NexTGen partnership, a collaboration of >130 researchers from 9 institutions in the UK, US and France. Funded by Cancer Research UK, National Cancer Institute (US), and The Mark Foundation for Cancer Research, NexTGen aims to develop chimeric antigen receptor (CAR) T cells to treat childhood solid cancers, with the vision of making CAR T cell therapy a frontline treatment within a decade.

My talk received positive feedback and sparked engaging discussions during the Q&A, where I had the pleasure of conversing with Dr Marjan Rafat (Vanderbilt University) and Dr Sasha Cai Lesher-Pérez (University of Michigan) about CAR T cell culture and scaffold printing.

Although primarily a chemical engineering conference, the AIChE Annual Meeting has a strong representation of bioengineers, supported by the Society of Biological Engineering. The popularity of bioengineering topics was evident in the need to divide the *"Engineered Biomimetic Tissue Models"* session into 3 parts, reflecting the growing interest of chemical engineers in interdisciplinary challenges, especially in biomedical research. For instance, cancer research now increasingly recognises the importance of physical factors, biomaterials, mathematical modelling, and fluidic, alongside traditional, biochemical approaches.

The conference featured inspiring talks from leading bioengineers, which reminded me of the tremendous contributions made by chemical engineers that have shaped the bioengineering. A highlight was the Cato T. Laurencin Regenerative Engineering Founder's Award Lecture presented by Prof Robert Langer (Massachusetts Institute of Technology), who discussed tissue engineering and drug delivery. Talks closely related to my research included a plenary lecture by Prof Daniel A. Hammer (University of Pennsylvania), who discussed the fascinating ability of T cells to migrate upstream against flow, a phenomenon that might aid trans-endothelial migration, crucial for cancer immunotherapy.

Additionally, Dr Christopher Moraes (McGill University) gave a fascinating talk on *"Biomimetic Mechanobiology: Measurement-Driven Design of Mechanically Responsive Biomaterials for Tissue Engineering Applications"*. He introduced hydrogelbased microspherical stress gauges, a novel tool to interrogate local tissue mechanical properties at cellular resolution, in contrast to global tissue characterisation. Moraes's team used this method to uncover focal sites of high intratumoural stiffness, providing insights into the mechanical evolution of the TME and its role in driving cancer invasion.

I am immensely grateful to the IET for awarding me the International Travel Award, enabling me to attend this high-profile meeting. It provided a platform to share my research with the bioengineering community and learn about the latest, cutting-edge advancements in the field. The Travel Award was crucial in making my attendance possible, as my CGC funding does not cover non-CGC events (e.g., AIChE meetings). To ensure sustainable travel, I used public transport and chose hotel accommodation within walking distance of the conference venue.

