Abstract

Recent advances in additive manufacturing (also known as 3D printing) enable the precise placement of multiple materials at micro-meter resolution with essentially no restrictions on the geometric complexity of the spatial arrangement, which make 3D printing used in various applications in visual aids, prototypes, dental industry and many others. Among these applications, 3D printing technologies are mainly used to either realize 3D model visualization, or create structural components to support loads. Recently, researchers and engineers have also made efforts to introduce new functionalities into 3D printed structures to realise functional 3D printing such as 3D printing of tissues and organs, metamaterials, 3D printing batteries and many others. One of the most notable examples is “4D Printing” which was realized by applying soft active material to 3D printing.

In this talk, I will first introduce our recent developments of functional 3D printing materials such as UV curable and mechanical tuneable shape memory polymer for multimaterial 4D printing, highly stretchable and UV curable elastomers that can be stretched by up to 1000%, and highly stretchable and UV curable hydrogels that can be stretched by up to 1300%. Using these functional 3D printing materials, we are able to fabricate highly complex multimaterial architectures that exhibit large deformation which can be further used in the applications of soft robotics and flexible electronics. Lastly, I will introduce an example of using hybrid 3D printing technologies to realise a fast-response and stiffness tuneable soft robots.

Biography

Dr Ge is currently a Tenured Associate Professor at Southern University of Science and Technology (SUSTech), China. Before joining SUSTech, Dr Ge was an Assistant Professor at Singapore University and Technology and Design (SUTD) from 2016 to 2019, where he was deeply involved in the founding and research activities of Digital Manufacturing and Design Centre (DMaND). Dr Ge received his PhD from University of Colorado at Boulder (CU Boulder), United States and later, he conducted Postdoctoral studies at CU Boulder, MIT and SUTD.

Dr Ge’s research interests evolve from modelling and experiments on soft active materials (SAMs), to advanced manufacturing approaches of SAMs, development of high-performance and 3D printable SAMs, and now to their applications in soft robotics and flexible electronics. Dr Ge has published more than 40 papers including the papers published on high-impact journals such as Nature Communications, Advanced Materials, Advanced Functional Materials, and JMPS. His collaborative works also appear on Science, Physics Review Letters, Advanced Energy Materials. Dr Ge is recognized as one of the pioneers of the 4D printing technology and he published the first journal paper on 4D printing. Dr Ge has received a few rewards including the National Talents Youth Program, IAAM Young Scientist Model, Outstanding PhD Dissertation Award of CU Boulder.

Thursday, 12 December 2019
Time: 2:00 pm – 3:00 p.m
Venue: MSE Conference Room (N4.1-02-02)
Hosted by: Assistant Professor Yu Jing