

EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

4D Printing with Photoactive Shape-Changing Polymer

ABSTRACT – 4D printing is an emerging additive manufacturing technology that combines 3D printing with smart materials. The 4D printed objects can change their shape over time (the 4th dimension) when applying heat, pressure, magnetic field, or moisture to the smart materials. Current 3D printing technology can print objects with a multitude of materials; however, these objects are static, geometrically permanent, and not suitable for multi-functional use. 4D printing with a light responsive shape-changing material is beneficial because light is wireless, easily controllable, and causes a rapid shape change of the smart material. This award supports fundamental research to generate knowledge needed for synthesis of a novel photoactive shape changing polymer (smart material) and integrating this smart material into objects printed with a 4D printing process using fused filament fabrication. 4D printed objects are programmable and can adapt to their environment. Therefore, they can find wider applications, including foldable unmanned aerial vehicles, artificial muscles, grippers, biomedical drug delivery systems, stents, and minimally invasive surgeries.



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SPEAKER BIO – Dr. Jack Zhou has been teaching and conducting basic and applied research in design and manufacturing, precision instrumentation and metrology for many years. His recent research is in additive manufacturing and 3D printing, biomedical design and manufacturing, especially in tissue and surgical engineering. He invented several new rapid prototyping machines and technologies for microstructures, bone scaffolds and soft-tissue fabrications. He has developed a new research field Bio-Micro-Nano Design and Manufacturing for Tissue and Surgical Engineering. Jack Zhou published more than 120 journal and peer reviewed conference papers, and 6 patents, and organized various conferences/symposiums nationally and internationally. He has received more than 35 grants from government, industry and research institutions, and advised more than 38 Ph.D. & Master students and post doctors. He is a fellow of ASME, and received many awards from various societies, organizations, and institutes. He received his B.S. and M.S. degrees from Xi'an Jiaotong University, China and Ph.D. degree from NJIT, USA. Currently he teaches and does researches in the Department of Mechanical Engineering and Mechanics at Drexel University, Philadelphia, USA.

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3:30PM – 4:50PM

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