Polymer Program

IMS | INSTITUTE OF MATERIALS SCIENCE

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Shape-shifting soft robots that adapt to changing tasks and environments

Abstract: Soft robots have the potential to adapt their morphologies, properties, and behavioral control policies in response to different environments, tasks, or perturbations. Leveraging inspiration from metamorphosing and generally adaptive animals, this talk will introduce several shape-changing soft robots capable of editing their physical structure to perform tasks more efficiently under changing demands or in multiple environments. The talk will also cover the multifunctional material systems that enable predictable shape-change, which when infused into soft robot platforms can unlock the potential of adaptive morphogenesis.

Bio: Rebecca Kramer-Bottiglio is the John J. Lee Associate Professor of Mechanical Engineering and Materials Science at Yale University. Focusing on the intersection of materials, manufacturing, and robotics, her group is deriving new multifunctional materials that will allow next-generation robots to adapt their morphology and behavior to changing tasks and environments. She is the winner of multiple early career awards including the NSF Career Award, the NASA Early Career Award, the AFOSR Young Investigator Award, and the ONR Young Investigator Award. She was named to the Forbes "30 under 30" list for her approach to manufacturing liquid metals through printable emulsions and scalable sintering methods. She received the Presidential Early Career Award for Scientists and Engineers (PECASE) award, the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers, for her development of robotic skins that turn inanimate objects into multifunctional robots. She serves as an Associate Editor of Soft Robotics and IEEE T-RO, as well as Senior Editor of IJRR, and was General Chair of the IEEE International Conference on Soft Robotics (RoboSoft) in both 2020 and 2021. She was named an IEEE Distinguished Lecturer in 2019, and she is a recipient of the 2022 National Academy of Engineering (NAE) Gilbreth Lectureship. She also serves on the Technology, Innovation & Engineering Committee of the NASA Advisory Council.