

# NEW RESORBABLE MATERIALS AND INKS ARE NEEDED IF ADDITIVE MANUFACTURING WILL REALLY CHANGE MEDICINE

Matthew Becker

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**Bio:** Matthew L. Becker is the W. Gerald Austen Endowed Chair of Polymer Science and Polymer Engineering at The University of Akron. His multidisciplinary research team is focused on developing bioactive polymers for regenerative medicine and addressing unmet medical needs at the interface of chemistry, materials and medicine. To date, his group has published more than 140 papers and has 50 patents issued or pending. He is the founder of three start-up companies, 3D BioResins, 3D BioActives and Fortem Polymers under the umbrella of 21st Century Medical Technologies.

Dr. Becker was recently awarded the 2019 Carl S. Marvel Award in Creative Polymer Chemistry from the American Chemical Society. He was a National Finalist in Chemistry for the Blavatnik Award in 2017. He was the Macromolecules-Biomacromolecules Young Investigator Award winner in 2015. Dr. Becker is a Kavli Fellow of the National Academy of Sciences and a Fellow of the Royal Society of Chemistry, the American Institute of Medical and Biomedical Engineering and the PMSE Division of the American Chemical Society.

**Abstract:** The evolution of resorbable materials is not keeping pace with the technology advances in additive manufacturing. Efficient, reproducible, and precise methodologies for fabricating patient specific scaffolds using three-dimensional (3D) printing techniques are evolving rapidly. Fusion deposition modelling (FDM), and photochemical printing have each been used widely for a number of applications. However, each has significant limitations, including translationally relevant materials that can be used with each printing system. Necessarily, new and promising materials must surface as alternatives to previously studied polyesters. We are developing two material platforms, amino acid-based poly(ester urea)s and functional poly(propylene fumarate), which can be printed using FDM and photo crosslinking methods, respectively. This presentation will describe the use of several translationally relevant chemistries and post-printing functionalization strategies that are impacting the practice of medicine and how physicians are planning for future therapies that were not possible previously.