

"Alkiviades Ch. Payatakes" Distinguished Lecture 2020

Biomaterials for Tissue Engineering and Disease Modeling

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Abstract

Advances in biology, materials science, chemical engineering, and other fields have allowed for the development of tissue engineering, an interdisciplinary convergence science. For the past two and a half decades, our laboratory has focused on the development and characterization of biomaterials-based strategies for the regeneration of human tissues with the goal of improving healthcare outcomes. In a collaborative effort with physicians, surgeons, and other scientists, we have produced new material compositions and three-dimensional scaffolds, and investigated combinations of biomaterials with cell populations and bioactive agents for their ability to induce tissue formation and regeneration. We have examined the effects of material characteristics, such as mechanical properties, topographical features, and functional groups, on cell behavior and tissue guidance, and leveraged biomaterials as drug delivery vehicles to release growth factors and other signals with spatial and temporal specificity. This presentation will review recent examples of biomaterials-based approaches for regenerative medicine applications and highlight future areas of growth, such as the use of tissue engineering to model tumor microenvironments for validation of cancer therapeutic discovery.

Short CV

Antonios G. Mikos is the Louis Calder Professor of Bioengineering and Chemical and Biomolecular Engineering at Rice University. His research focuses on the synthesis, processing, and evaluation of new biomaterials for use as scaffolds for tissue engineering, as carriers for controlled drug delivery, as non-viral vectors for gene therapy, and as platforms for disease modeling. His work has led to the development of novel orthopaedic, dental, cardiovascular, neurologic, and ophthalmologic biomaterials. He is the author of over 640 publications and the inventor of 32 patents. Mikos is a Member of the National Academy of Engineering, the National Academy of Medicine, the National Academy of Inventors, the Academia Europaea, and the Academy of Athens. He has been recognized by various awards including the Lifetime Achievement Award of the Tissue Engineering and Regenerative Medicine International Society-Americas, the Founders Award of the Society For Biomaterials, the Founders Award of the Controlled Release Society, the Acta Biomaterialia Gold Medal, and the Robert A. Pritzker Distinguished Lecturer Award of the Biomedical Engineering Society. He is a founding editor and editor-in-chief of the journal Tissue Engineering.