

Biomaterials for Tissue Engineering and Disease Modeling

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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.