DWI
Leibniz-Institut für
Interaktive Materialien

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"Designer materials for biofabrication of human tissue mimics"

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During development and disease, a cell's behavior is directly influenced by its surrounding microenvironment. Thus, when designing patient-derived organoid models, ideally each tissue type would be cultured in its own customizable biomaterial that matches the specific developmental stage or disease state found *in vivo*. To fulfill this need, my lab designs bespoke biomaterials that can be tailored to fit a range of applications. In one demonstration, I present a family of dynamic biomaterials that support the growth of patient-derived pancreatic ductal adenocarcinoma (PDAC) organoids. Through control of the matrix, we find that PDAC becomes significantly more chemoresistant in response to mechanosignaling through CD44 receptors. Excitingly, this chemoresistance is reversible, with PDAC regaining sensitivity to frontline chemotherapy upon softening of the matrix. In a second example, I present a new "pick-and-place" 3D-bioprinting strategy for the spatial positioning of neural organoids within a dynamic support matrix. Using this method, we can fabricate large tissue structures composed of multiple organoids that fuse together. We demonstrate potential applications in the fabrication of neural "assembloids" composed of dorsal- and ventral-patterned neural organoids together with patient-derived brain cancer spheroids. We envision that these two technologies will be used together in the future to create personalized tissue models of individual patients.