Monday, February 21
3:30 PM – 5:00 PM
Esplanade, Room 157
Curi Bio

Bioengineering the Cell Environment for More Mature and Predictive 2D & 3D Models
Cells in the body use a variety of cues (structural, mechanical, electrochemical, etc.) from the extracellular matrix (ECM) to develop and mature physiologically. These influential cues help regulate a broad spectrum of processes such as cell signaling, division, and differentiation. Many in vitro platforms seek to combine and incorporate these cues into the cell's microenvironment but often fail, suffering from lack of reproducibility and incompatibility with other well-established end-point assays.

Here, we demonstrate biomimetic in vitro platforms capable of reliably reproducing these essential cues. These platforms markedly improve the structural and functional development of a variety of cell types, including stem cells, cardiomyocytes, muscle cells, and more. These cutting-edge strategies can be deployed in both 2D and 3D model systems for high-throughput assessment of metabolism, electrophysiology, and contractility. We describe how the differentiation of stem cells can be enhanced by providing a more biomimetic culture environment, with a particular focus on iPSC-derived cardiomyocytes and skeletal muscle cells. Further, we highlight how an active mechanical environment combined with aligned cell-nanotopography cues improves adhesion, signaling, and polarity across many cell applications. Finally, we demonstrate how to scale these technologies to 3D organoid systems, and how these approaches can improve the development of in vitro disease models to support the discovery of new therapies.

Speaker
Hamed Ghazizadeh, Product Manager, Curi Bio