

MIT Chemical Engineering Department

Spring 2018 Seminar Series

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# Adaptable Biomaterials for Expansion and Transplantation of Stem Cells



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**Friday, May 18, 2018**

**3:00pm, Reception at 2:30pm**

**66-110**

**Abstract:**

While neural progenitor cells (NPCs) have significant therapeutic promise, the difficulty and cost of expanding and delivering a large number of NPCs remain significant barriers to widespread clinical use. Recently, hydrogels have been proposed as *in vitro* platforms for the expansion of stem cells to overcome the limitations of 2D culture. However, very little is known about which 3D material properties are required to maintain NPCs in an undifferentiated state for expansion. Using a family of protein-engineered biomaterials, we demonstrate that 3D matrix stiffness does not correlate with the maintenance of NPC stemness over a broad range of mechanical properties ( $E \sim 0.5$ -50 kPa). In contrast, matrix degradability strongly correlated with the expression of NPC stem markers and NPC proliferation. Our results have identified matrix remodeling as a previously unknown requirement for maintenance of NPC stemness in hydrogels and suggest that adaptable biomaterials will be useful for expansion and transplantation of NPCs.