



# Soft Living Active and Adaptive Matter



## Oxygen-releasing microparticles improve cardiomyocyte contractility under hypoxia

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### Abstract:

In popular usage, the phrase: 'to give oxygen' is used as synonymous to giving life itself! Yet, our basic biophysical understanding of how to overcome low oxygen tension in the heart tissue, i.e., myocardial hypoxia, has significant lacunae. That myocardial hypoxia is a portal to a plethora of diseases, including ischemia, cardiac dysfunction, or after heart procurement for transplantation, underscores the urgent need to close fundamental gaps in understanding in this context. Promisingly, oxygen-generating microparticles have recently emerged as a potential strategy for supplying oxygen to sustain cell survival, growth, and tissue functionality in hypoxia. In this talk, I will present a unique combination of technologies that feature biodegradable oxygen-releasing microparticles capable of sustained oxygen release for more than 24hrs. Levering this advance, we have characterized the application of oxygen-releasing microparticles for cardiomyocytes (CMs) cell and tissue function using neonatal rat CMs to model ischemic injury. Using traction force microscopy and an engineered tissue-on-a-chip, we have demonstrated that our oxygen-releasing microparticles improve cell and tissue contractility during hypoxia while downregulating the HIF-1 $\alpha$  expression level. Finally, I will discuss how, by using the microparticles, we reduced myocardial injuries in rabbit heart tissue, confirming the potential of these particles as exciting candidates for organ transplantation or tissue engineering.

Date:  
08/29/2022

Time:  
9:00 AM-10:15 AM (PT)

### About the speaker:

Dr. Kalpana Mandal is a broadly trained biophysicist, with an interest and extensive track record of working on problems involving cell mechanics, cancer physics, organ-on-a-chip, and tissue engineering. Dr. Mandal received her Ph.D. in Biophysics from the University of Joseph Fourier, CNRS, France.

Currently, Kalpana is a postdoctoral fellow at Terasaki Institute for Biomedical Innovation in the group of Prof. Ali Khademhosseini, where she is pioneering and leveraging tissue engineering and tissue mechanics techniques to identify potential strategies for supplying oxygen to sustain cell survival, growth, and tissue functionality in hypoxia. When not immersed in lab work, Kalpana enjoys spending her time reading, playing board games, or hiking.



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