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טכניון-מכון טכנולוגי לישראל
הפקולטה להנדסת חשמל
המרכז לננואלקטרוניקה על שם שרה ומשה זיסאפל
מרכז וולפסון למיקרואלקטרוניקה
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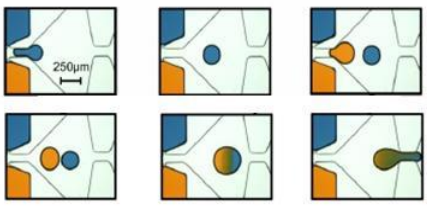
Prof. Shulamit Levenberg (Biomedical Engineering)

Research Interests: Vascularization of engineered tissues. Stem cell differentiation on 3D scaffolds. Controlling stem cell microenvironments. Development of Microfluidic devices and droplet arrays .

The Levenberg lab is interested in understanding cellular interactions, forces and movements during stem cell differentiation and tissue formation. A specific interest of the lab is in understanding the dynamic of tissue vascularization both in vitro, within engineered tissues, and in vivo, following integration of implanted tissue constructs. Vascular patterning involve signaling between neighboring endothelial cells which define the rapid switch between leading tip cells and stalk cells, as well as signaling by other cell types in the tissue guiding the sprouts directions, complexity and stability, thus together defining the overall pattern. Our aim is to understand how cell migration, gene expression and cellular forces are jointly coordinated to achieve defined vascular patterns within defined tissue environment, and how these networks signal to the surrounding tissue to affect its differentiation, survival and function. To study these interactions we developed a multicellular model of vascular network formation within engineered tissues. Since implanted tissue induces a rapid vascularization process that involves anastomosis and perfusion of preexisting tubes with newly formed sprouts we develop in vitro and in vivo systems to study these cellular interactions. In addition, single/double cell cultures in microfluidic droplets array methods are been developed in the lab to allow higher resolution into specific cellular interactions in response to defined stimulus, thus providing exciting insights into stem cell differentiation and endothelial patterning.



A. Microfluidic droplet arrays controlling droplet merging.
B. Microfluidic traps supporting prolonged culture of human embryonic stem cells aggregates