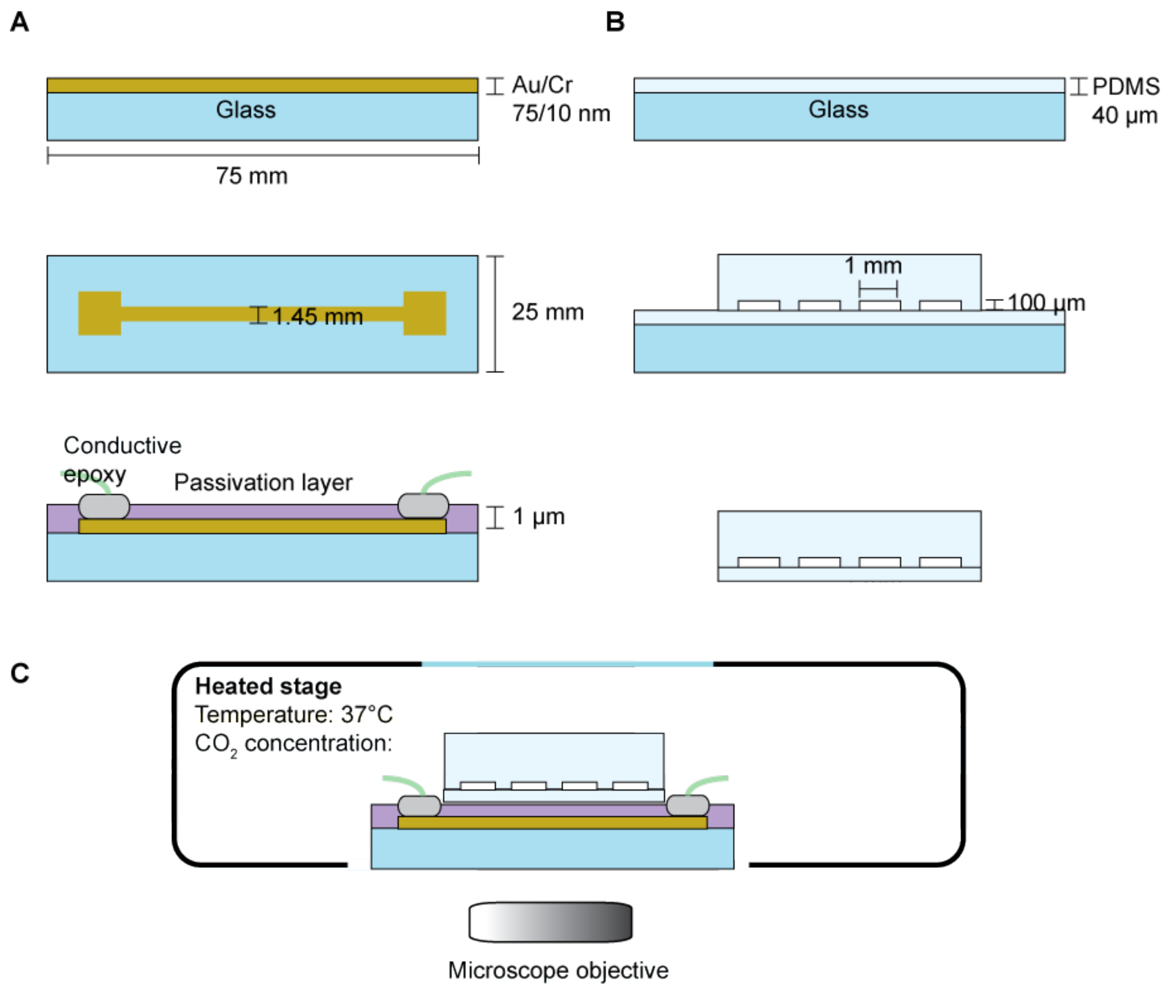
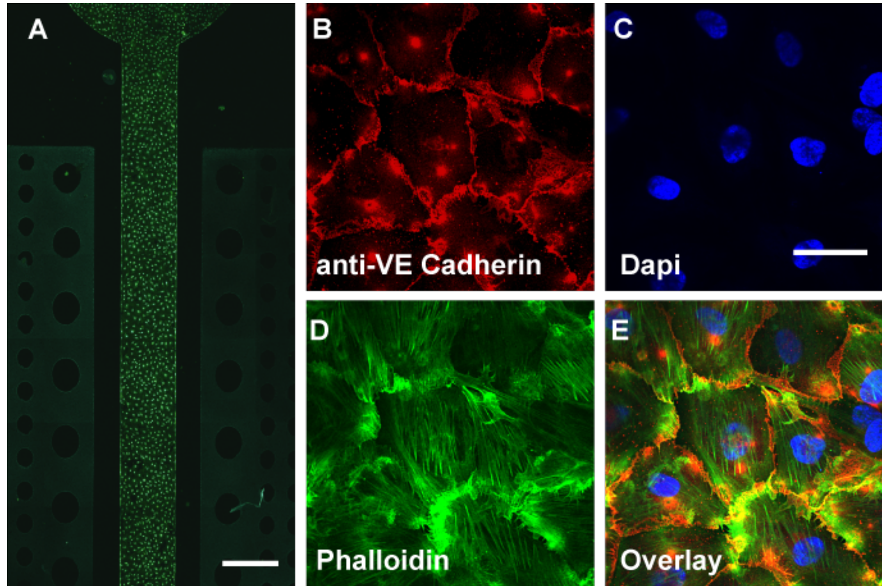
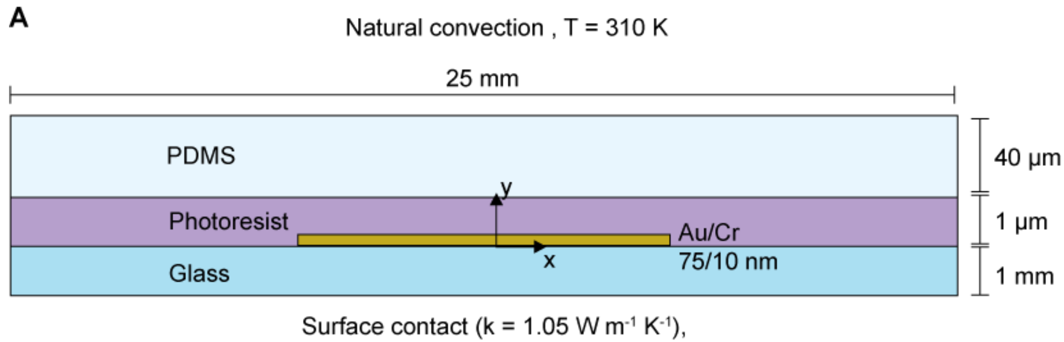
SUPPLEMENTARY INFORMATION

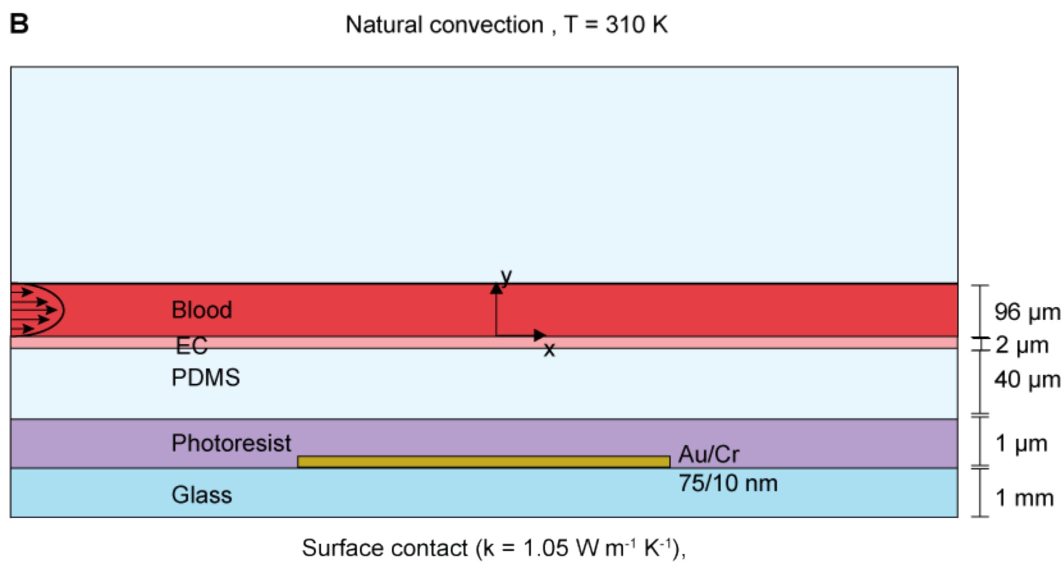


Supplemental Figure 1. (A) Thermal evaporation of Cr/Au (10 nm/100 nm) was patterned into electrodes of width 1450 μm by wet etching. (B) Microfluidic channel were fabricated be oxygen plasma bonding the device to a spin-coated film of PDMS. HUVEC were seeded and grown to confluence in the microfluidic channels. (C) The endothelialized microfluidic channels were placed on top of the electrodes and 5-9 V were applied across the microelectrode for 30 s. All experiments were conducted in a heated stage kept at 37 °C and 5 % CO_2.

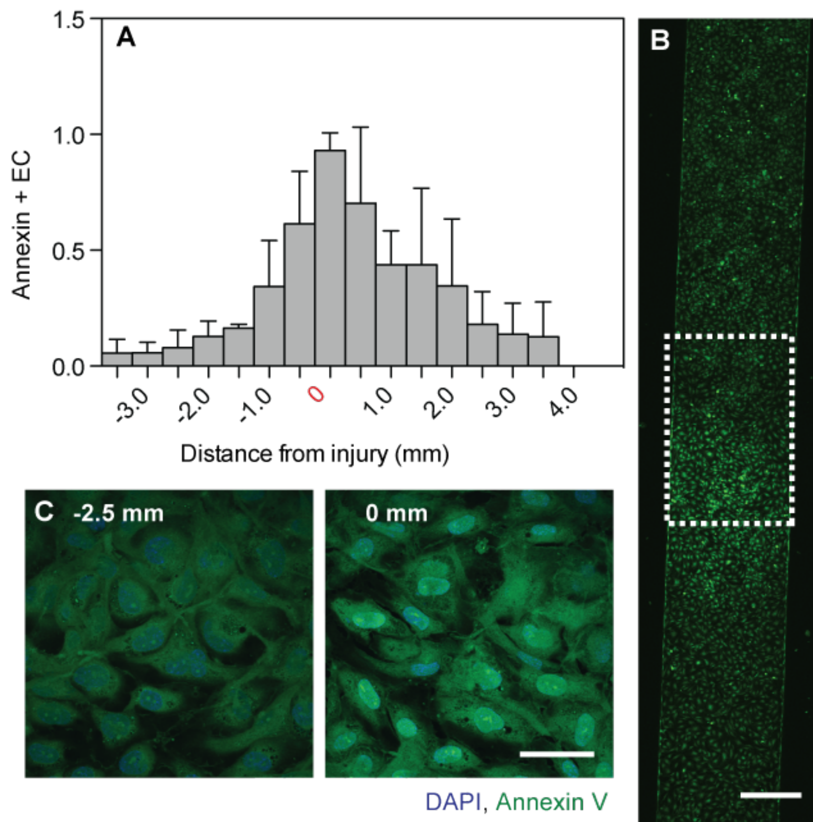


Supplemental Figure 2. Confluence endothelial cell monolayers in PDMS channels. HUVEC stained with DAPI (blue), FITC Phalloidin (green) at (A) 2.4x (scale bar = 1 mm). EC in the microfluidic channels were stained for (B) VE-Cadherin, (C) DAPI, and (D) phalloidin. (E) The overlay of all the stains together. (scale bar =50 μm).

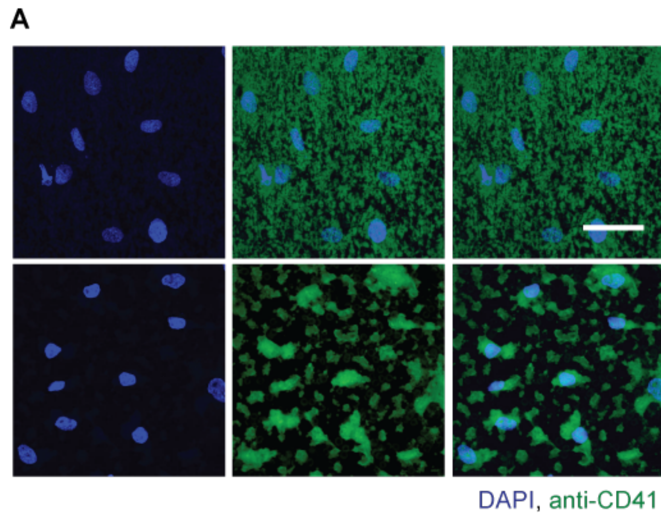


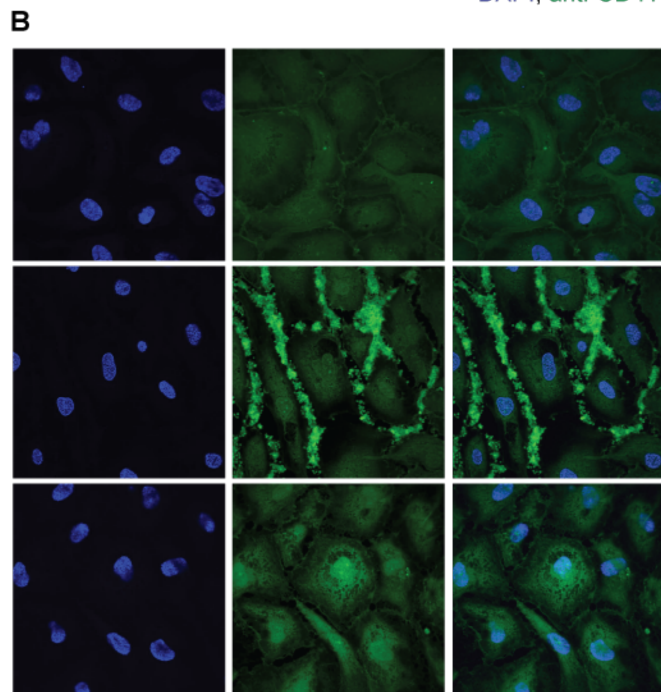


Supplemental Figure 3. A 2D diagram (z vs x direction) of the dimensions and geometry of the materials included in the COMSOL simulation for (A) a 40 μm PDMS thick film atop the microelectrode (Model 1) and (B) the entire assembled device (Model 2). Conduction occurs in the all of the material and convection occurs in the flowing blood. Diagrams not to scale.

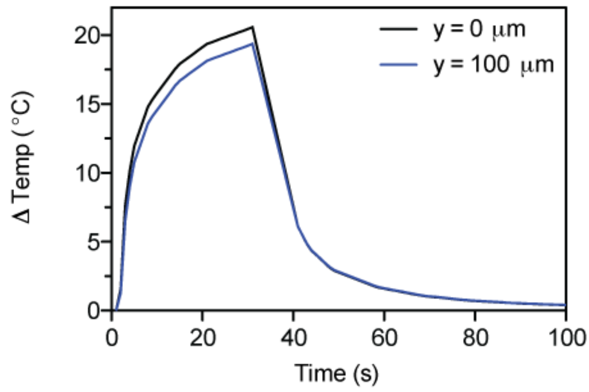


Supplemental Figure 4. HUVECs expose phosphatidylserine (PS) (annexin V) after being heated at 7 V. (A) Fraction of Annexin positive EC are shown relative to the position of the injury. Representative images show increased fluorescence of Annexin V in a (B) zoomed out image (scale bar = 0.5 mm) and (C) zoomed in image. Scale bar = 50 µm

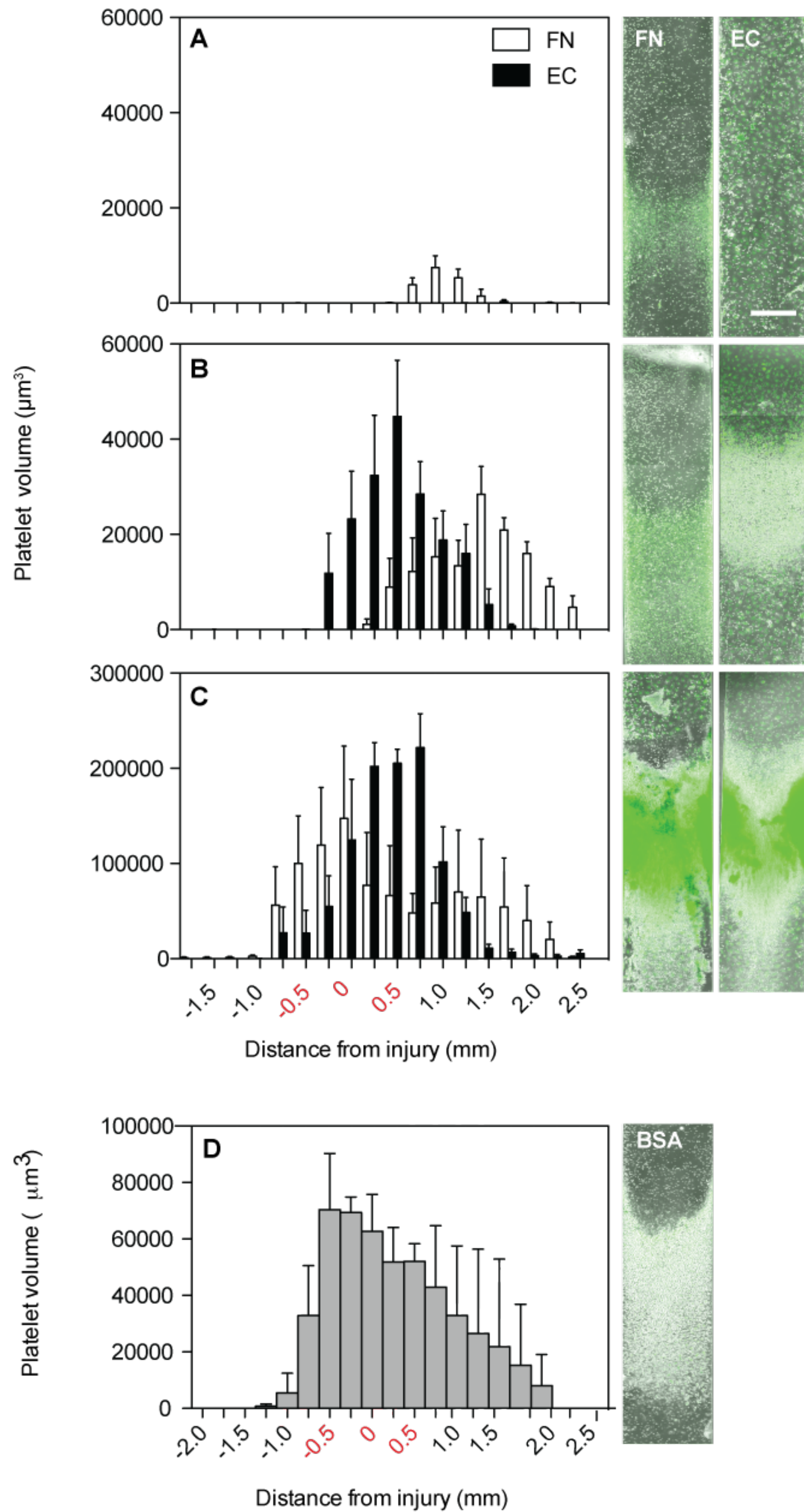




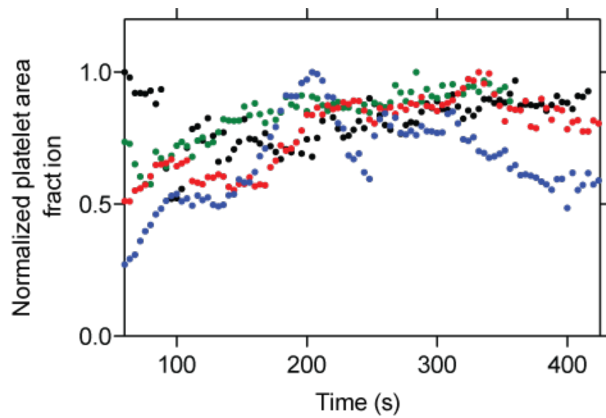
Supplemental Figure 5. Representative images of DAPI and anti-CD41 labels and their respective overlays for (A) simultaneous heat injury and whole blood perfusion and (B) whole blood perfusion following injury. Scale bar = 50 µm.



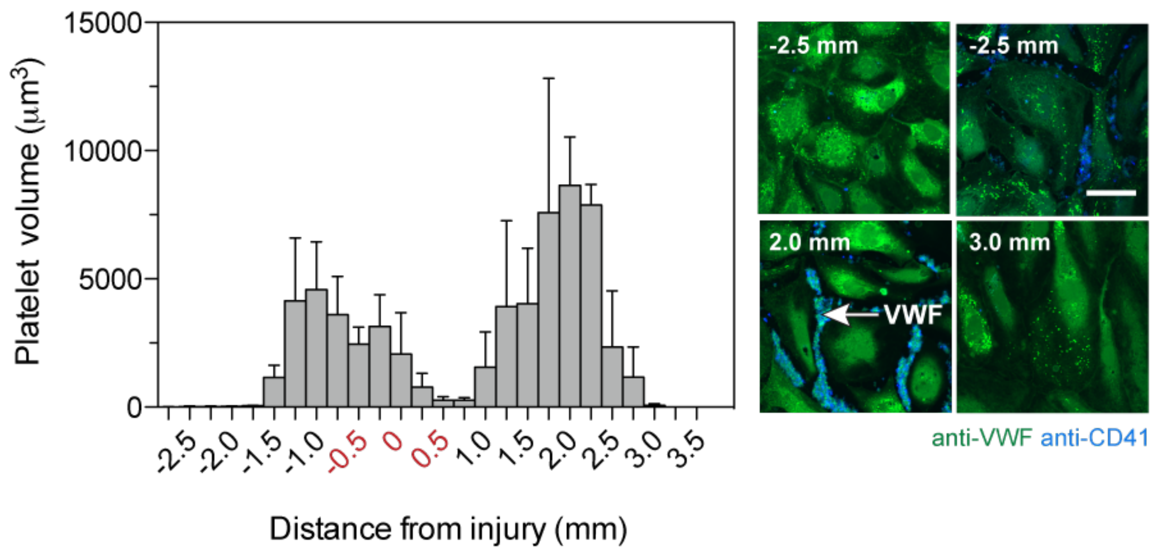
Supplemental Figure 6. Heat penetration into the channel. Change in temperature at x = 0 at the bottom of the channel (y = 0 μm, black) and at the top of the channel (y = 100 μm, blue) according to Model 2.



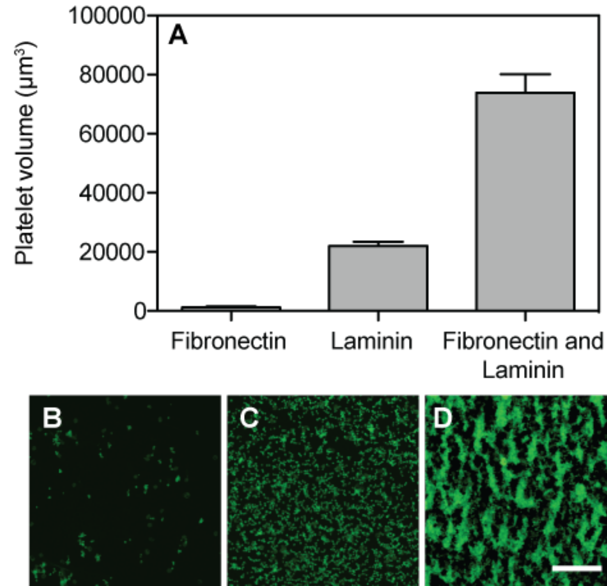
Supplemental Figure 7. Platelet aggregate volumes (green) and representative images after simultaneous heat injury and whole blood perfusion on fibronectin and EC at (A) 6, (B) 7, and (C) 8 V. Note that the y-axis scale in (C) is five times as large as the y-axis in (A) and (B). (D) Platelet accumulation is shown in a channel coated with BSA that was heated while whole blood was being perfused. Scale bar = 500 µm



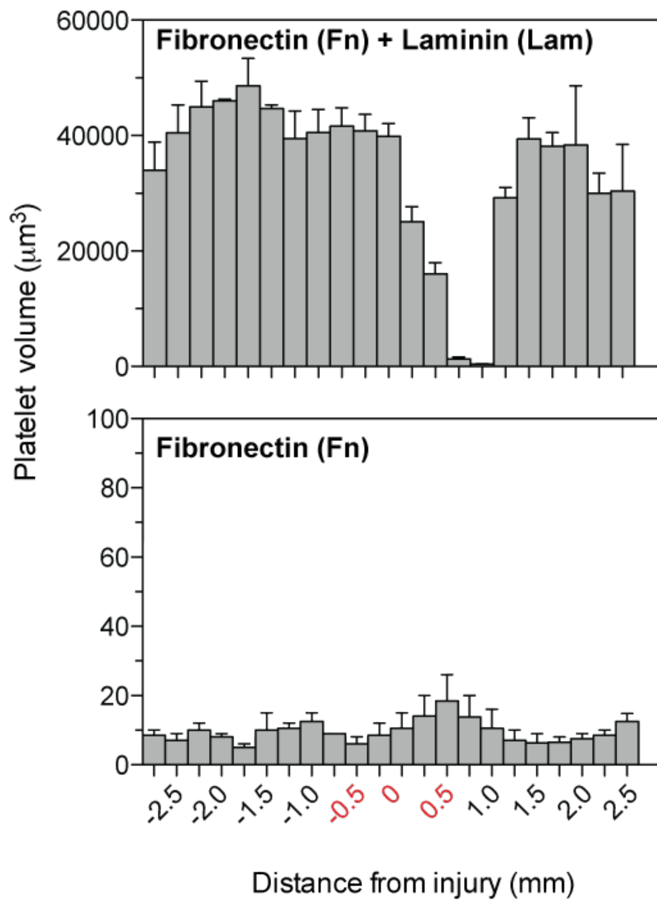
Supplemental Figure 8. Normalized platelet area fraction over time 1.0 mm downstream of the electrode center at 7 V. Transient platelet aggregation remains steady for the last 6 min of the assay demonstrating that platelet aggregates do not grow beyond the recessed areas between the cells.

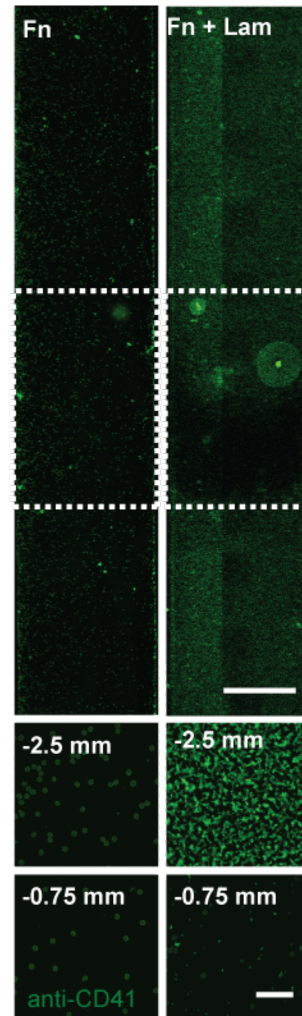


Supplemental Figure 9. Platelet volumes and representative images of platelet accumulation at 1000 s^{-1} following heating by 7 V for 30 sec. Red numbers indicate locations directly over the gold electrode. The electrode ranges from -725 to +725 μm. Scale bar = 50 μm.



Supplemental Figure 10. Platelet accumulation on purified protein surfaces. (A) Platelet volumes are quantified over proteins patches composed of fibronectin, laminin and a 1:1 mixture of fibronectin and laminin. Representative images show platelet accumulation on (B) fibronectin, (C) laminin and a (D) mixture of laminin and fibronectin. Scale bar = 50 µm.





Supplemental Figure 11. Platelet accumulation on purified protein surfaces that have been heated for 30 s at 7 V. Representative images show platelet accumulation on fibronectin and fibronectin/laminin surfaces. Zoomed out image (Scale bar = 0.5 m). Zoomed in image (Scale bar = 50 μm).