Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplementary Information for

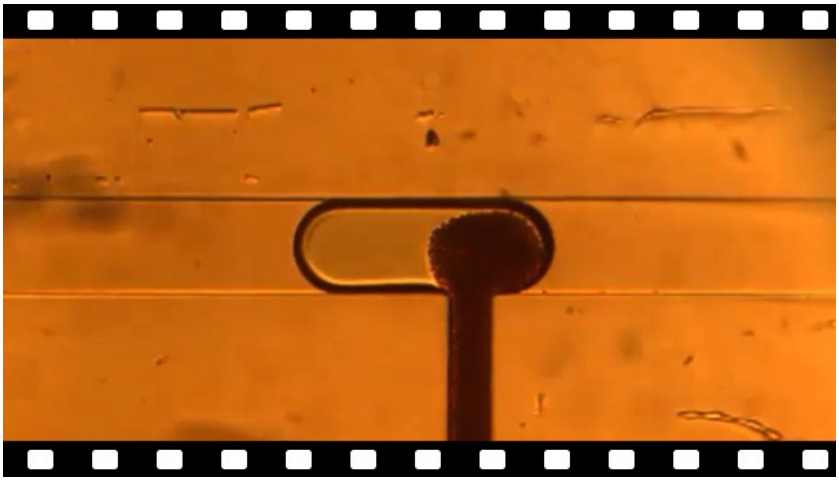
Impedimetric detection and lumped element modelling of hemagglutination assay in microdroplets

Merve Marcali and Caglar Elbuken*

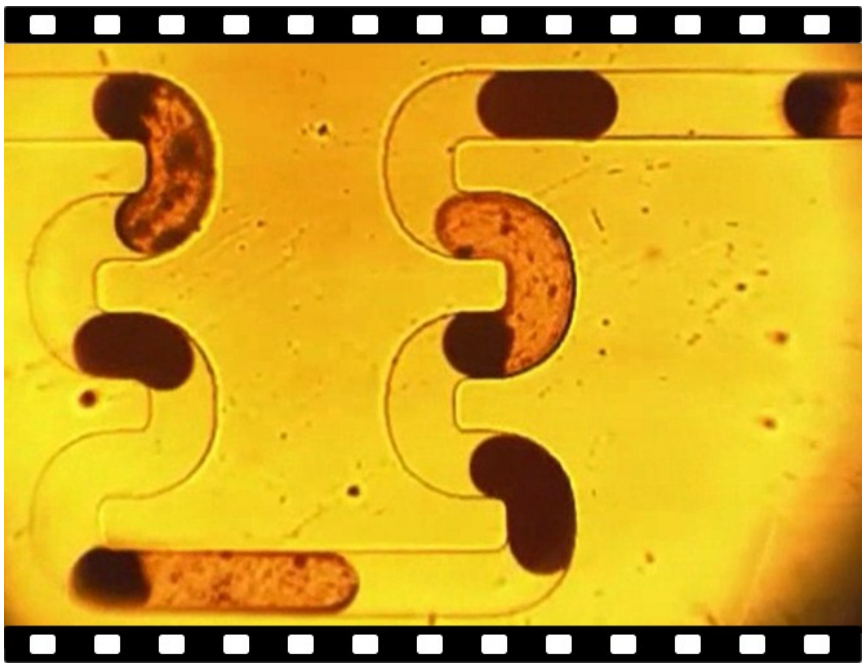
UNAM - National Nanotechnology Research Center, Institute of Materials Science and Nanotechnology, Bilkent University, 06800 Ankara, Turkey.

** Correspondence to Caglar Elbuken, Phone: +90 312 290 3550, Fax: +90 312 266 4365, E-mail: elbuken@unam.bilkent.edu.tr*

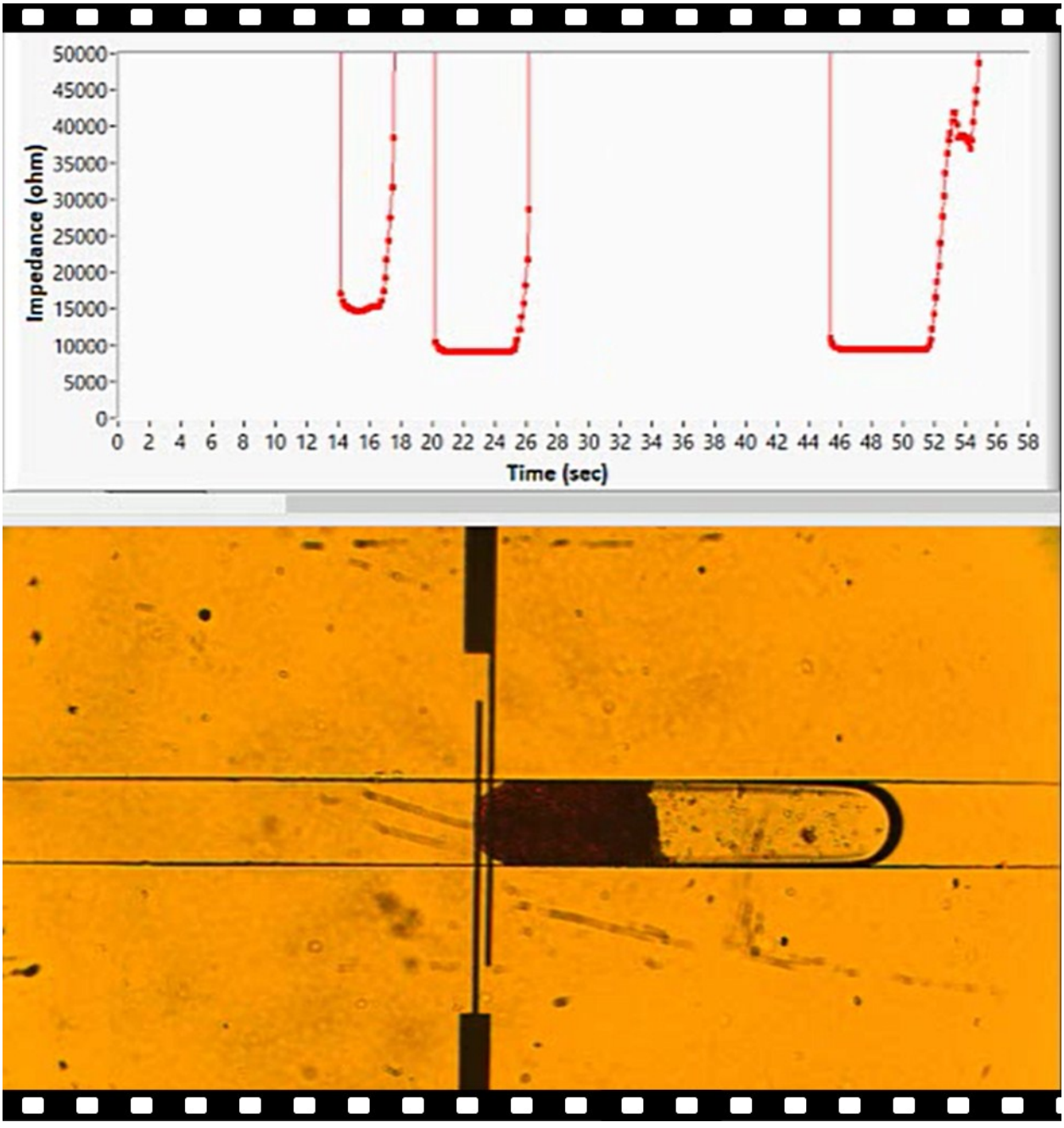
Supplementary Video 1. Video of the merging of antibody microdroplet with whole blood:PBS sample using a side injection T-junction geometry. The system is controlled with a pressure pump system. After the inlet pressures are adjusted, the system works in synchronization and continues injection of the sample into antibody droplets for over 60 min.

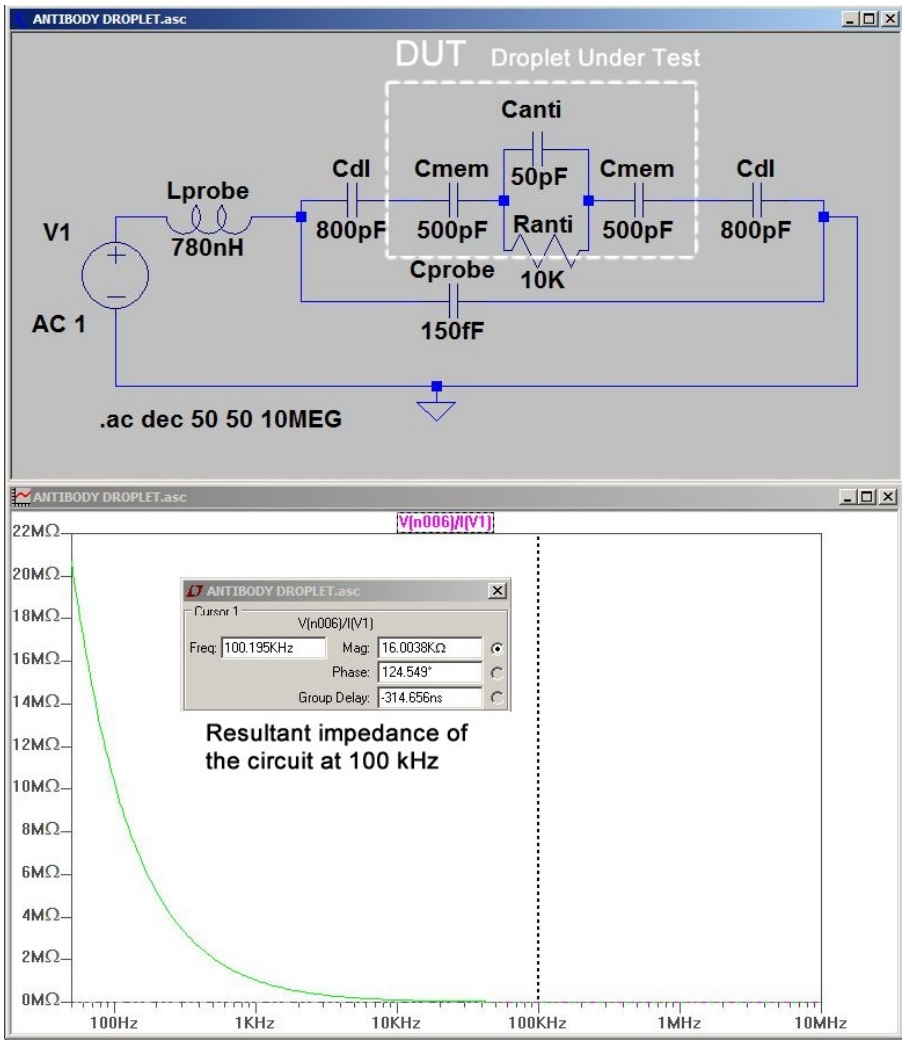


Supplementary Video 2. Video of the mixing of microdroplets using serpentine channel geometry. The antibody and sample mixed microdroplets are separated with sample droplets. At the end of the serpentine section agglutination of red blood cells generates a cell clump at the trailing edge of the droplet.



Supplementary Video 3. Video of the real-time impedance signal obtained from whole blood/PBS droplets, antibody droplets and sample-antibody mixed droplets. The characteristic signal for the accumulated cells can also be seen. Detection was performed using coplanar electrodes and an LCR meter.





Supplementary Figure 1. LTspice simulation of an antibody solution droplet: a) the circuit model schematic of the case shown in Fig. 8c, b) impedance waveform. For each scenario in Fig. 8, the DUT (droplet under test) section of the schematic is modified in order to find the individual circuit elements. The resultant impedance waveforms obtained by the LTspice simulator are shown in Fig. 9.