Supplementary material - Universal microfluidic platform for bioassays in anchored droplets

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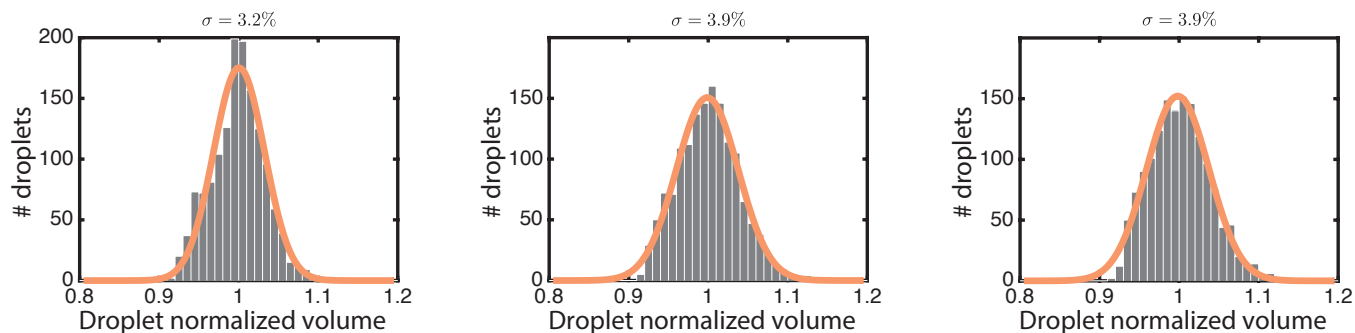
SUPPLEMENTARY FIGURES

FIG. S1. Distribution of normalized droplet volumes on a chip, for experiments with liquid droplets. The same microfluidic chip is used for all three experiments. The standard deviation on droplet volumes is indicated for each distribution.
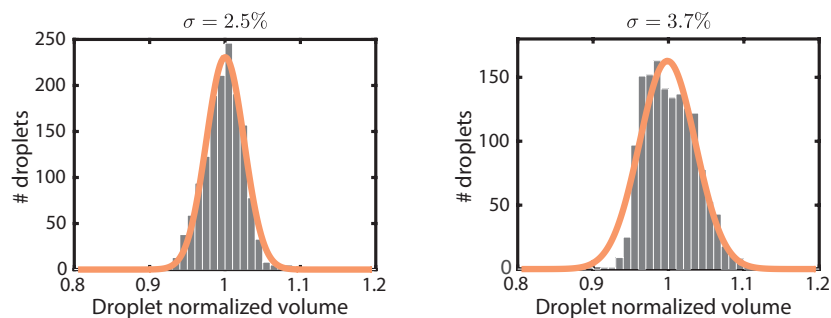

FIG. S2. Distribution of normalized droplet volumes on a chip, for experiments with agarose droplets. Each histogram corresponds to a different experiment, on a different microfluidic chip.
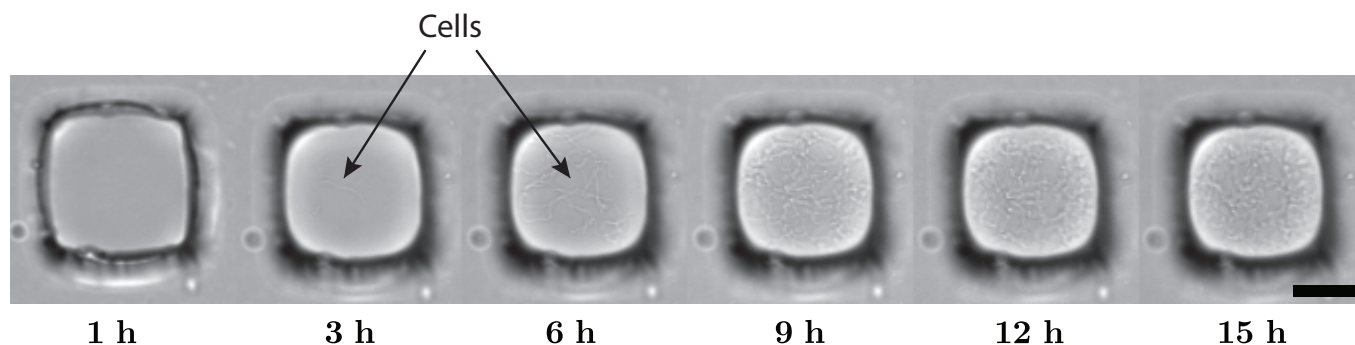

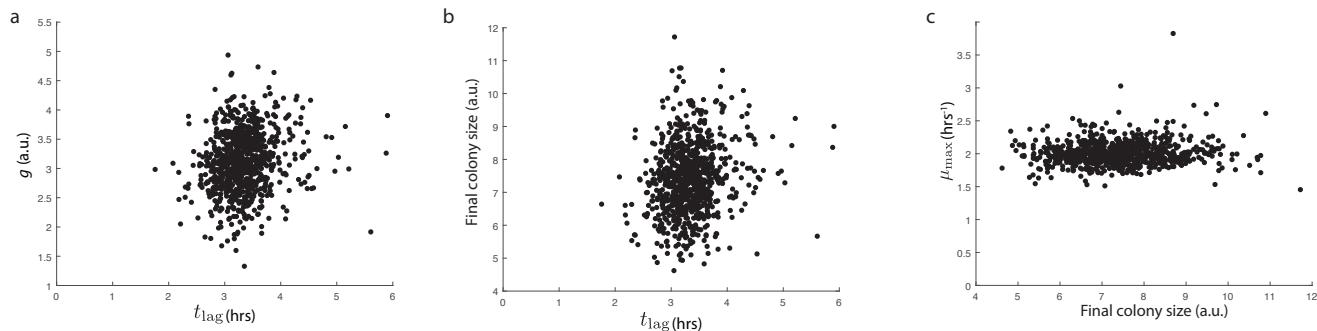FIG. S3. Bacterial growth in a liquid droplet. Scale bar: 50 μm.

FIG. S4. Analysis of bacterial growth parameters (a) Maximum growth rate vs. lag time. (b) Final colony size vs. lag time. (c) Maximum logarithmic growth rate vs. final colony size. No correlations between any of these parameters were observed.
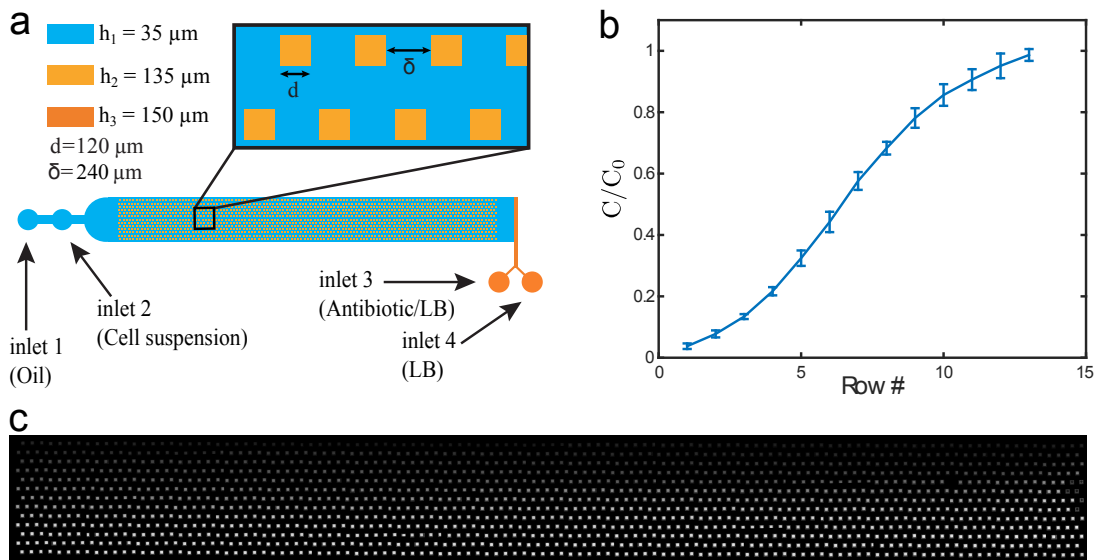

FIG. S5. (a) Modified chip design for the on-chip antibiogram. Two additional inlets (inlets 3 and 4) enable the formation of a gradient of antibiotics. The gradient forms perpendicular to the flow direction, and molecules of interests diffuse into the trapped agarose droplets. In the current chip comprising an array of 13x115 droplets, 13 different concentrations are probed, and each concentration is applied to the contents of 115 agarose droplets. (b) To determine the concentration applied in each droplet, gradient formation is tested with fluorescein with both flow rates of 3 $\mu L/min$ at inlets 3 and 4. The normalized fluorescein concentration is shown as a function of the droplet row number. Each point is an average over 115 trapped droplets. Error bars show the standard deviation on each row. (c) Fluorescence of the trapped agarose droplets when a gradient of fluorescein is applied.
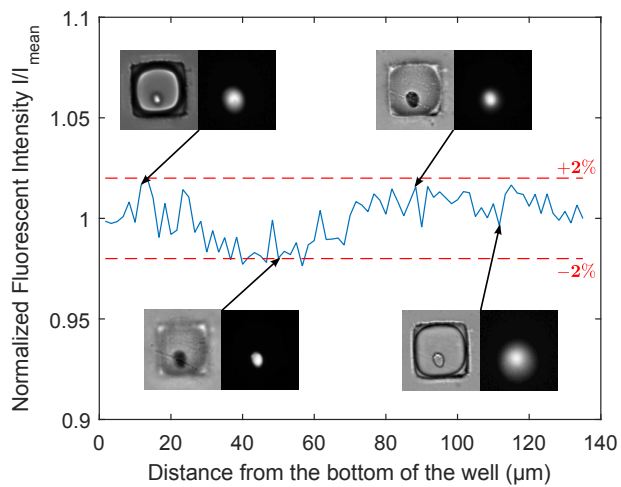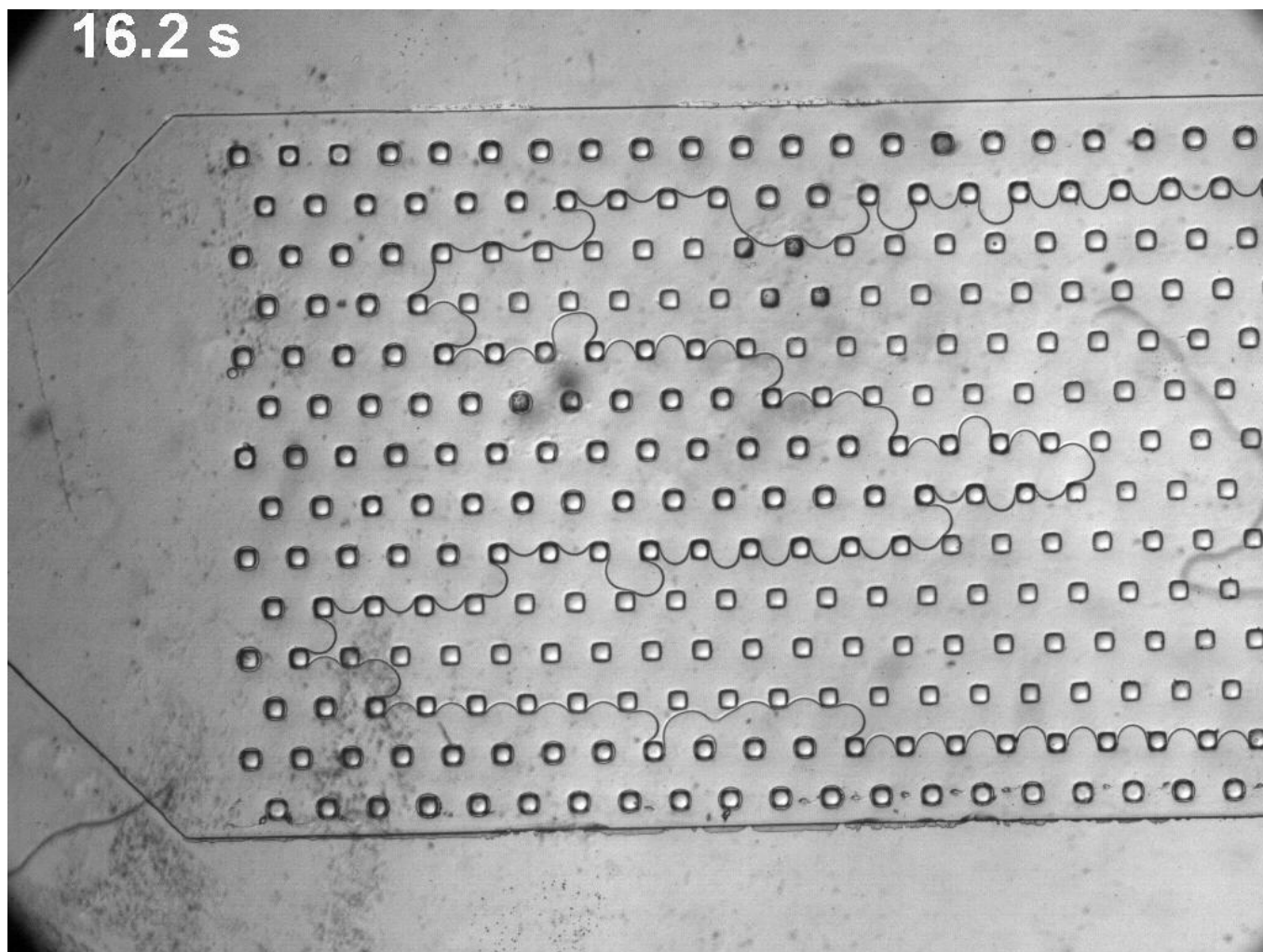
FIG. S6. Fluorescence signal of a bacterial colony integrated on the entire trap for different z planes, from the bottom to the top of the trap. The integrated fluorescence intensity does not vary by more than 2%, confirming that not being perfectly in focus for each drop does not lead to any loss of information.

SUPPLEMENTARY MOVIES

MOVIE 1. Breaking agarose droplets on a 2D array of surface-tension anchors. A flow of oil is imposed by hand in the channel, which pushes the agarose and eventually leaves independent, well-calibrated agarose droplets on each anchor. The flow goes from left to right.
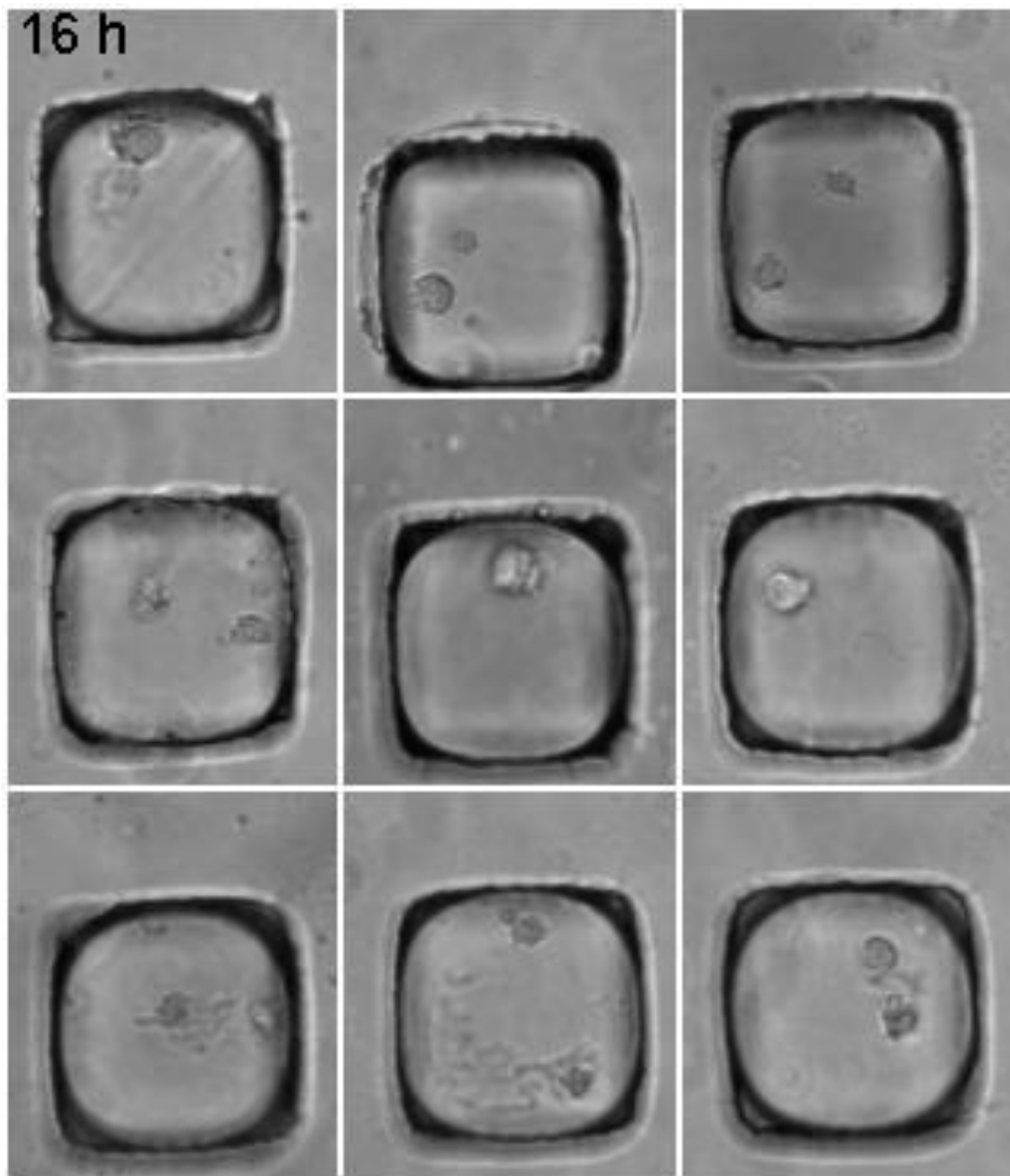
MOVIE 2. Growth of monoclonal colonies of *E. coli* in gelled agarose droplets, immobile in their respective anchors.
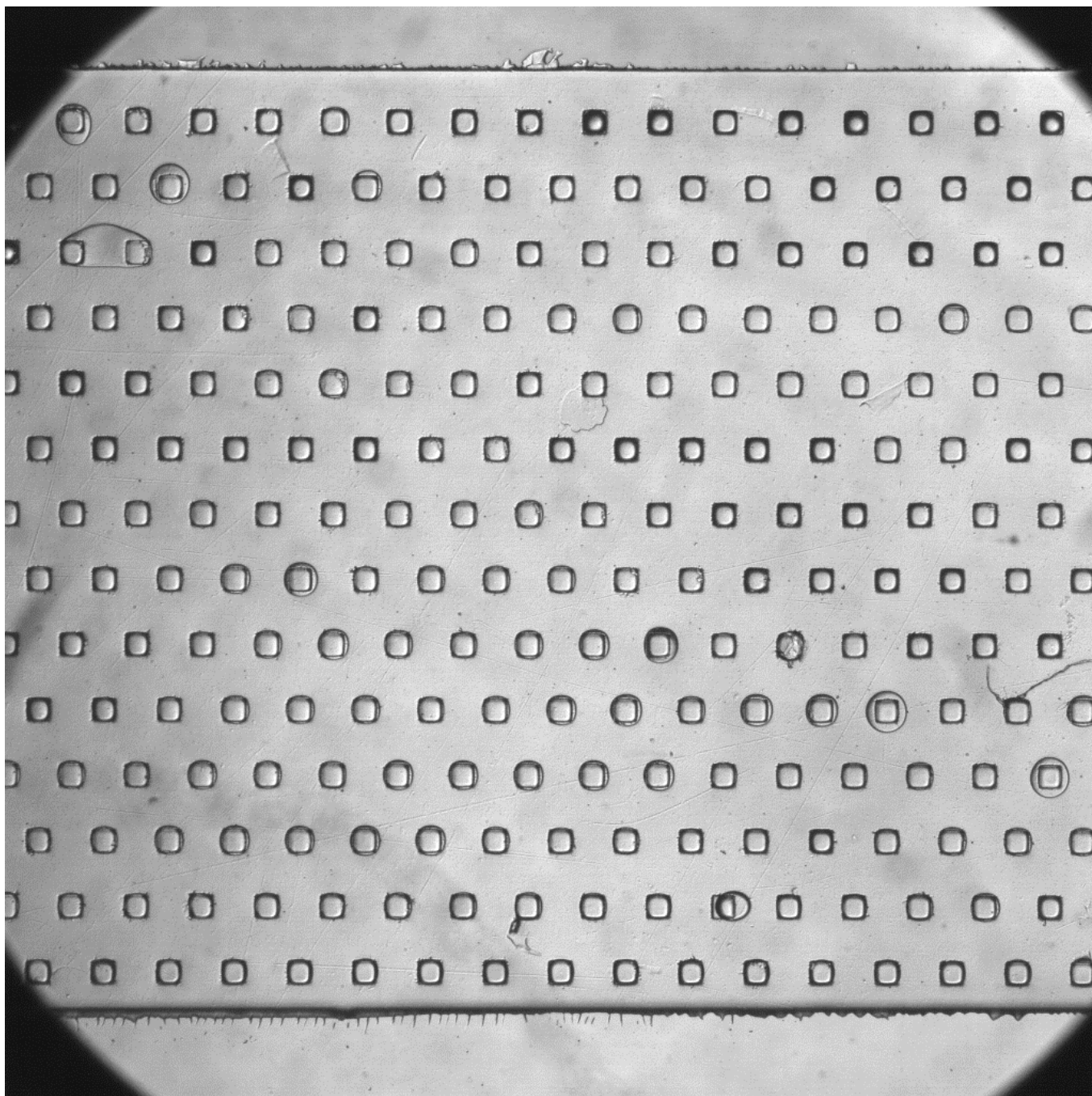
MOVIE 3. Extraction of a selected droplet out of the microfluidic platform for further analysis. The selected droplet was liquefied by focusing an infra-red on it. All other droplets are in their gel state. Applying a flow rate of 280 μL/min forces the liquid droplet out of its anchor, and pushes it out of the device, where it is recovered in an eppendorf tube. All other droplets remain immobile in their traps.