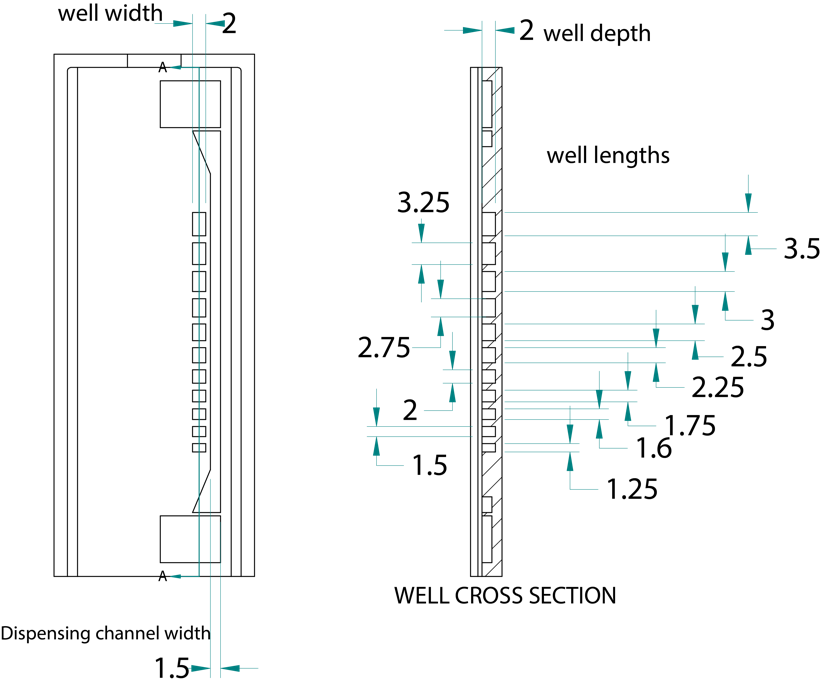
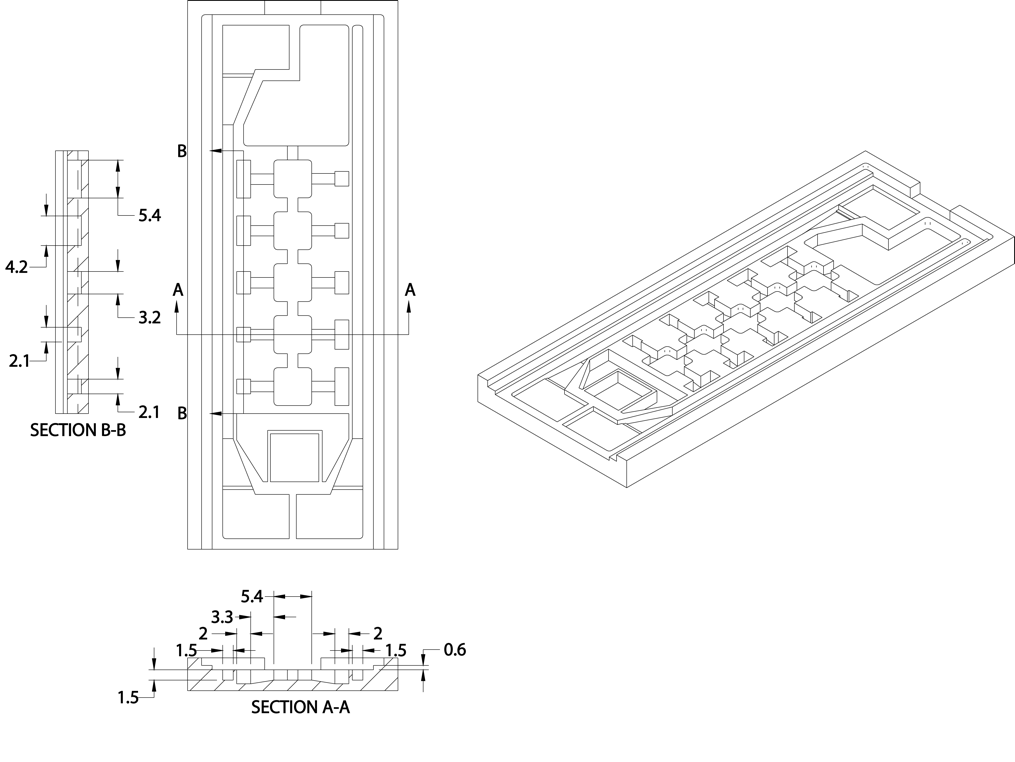
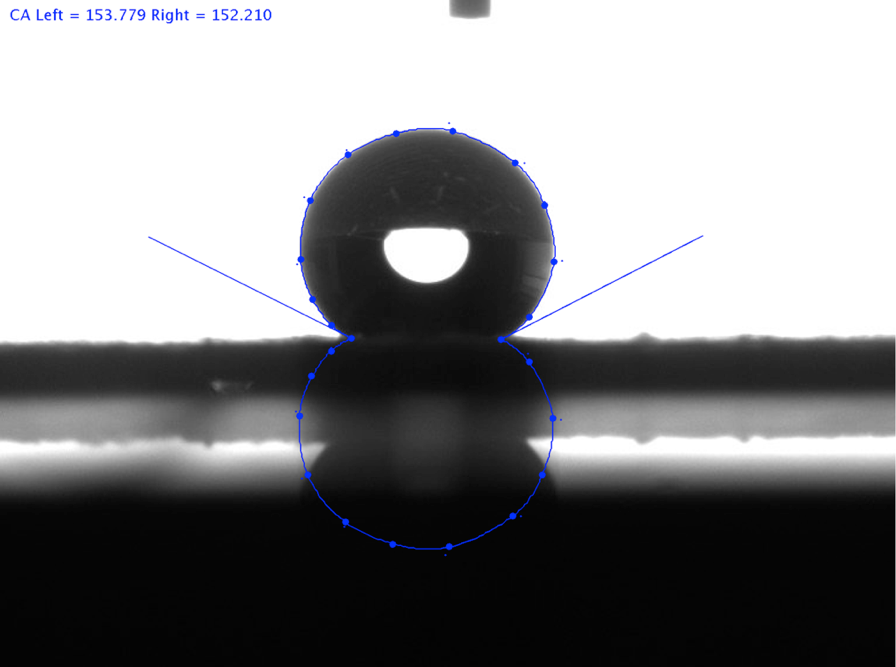
Electronic Supplementary Information



**Fig. S1** A detailed diagram of the volume determining chip showing well sizes



**Fig. S2** A detailed diagram of the titration determining ship showing channel and well dimensions for two cross sections: (A) a cross section across the chip from left to right showing the layout of the wells and mixing chamber and (B) from top to bottom showing the well dimensions for the left set of wells



**Fig. S3** A photo of a drop on Ultra-Every Dry showing a contact angle in excess of 150° as analyzed using ImageJ

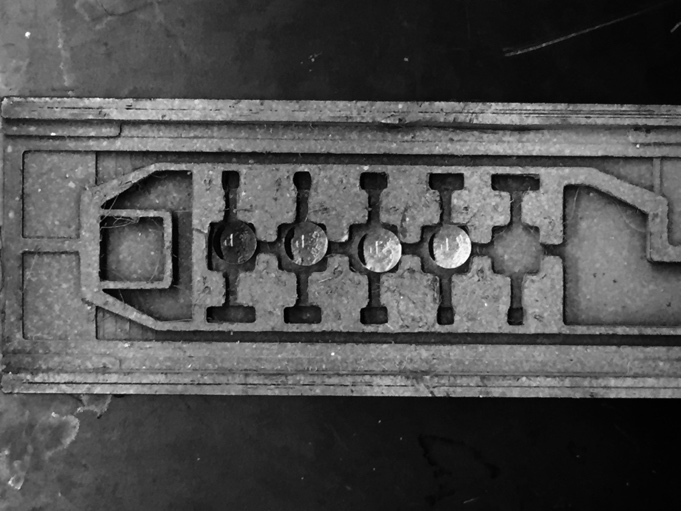
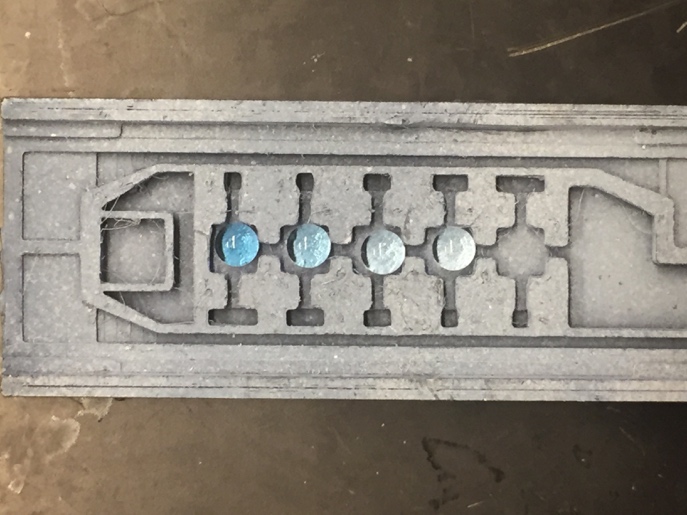


**Fig. S4** A section across a 0.70 mm of a 3D printed cube (print side) and plate (print surface) created using the same optimized print settings and coating method as the presented microfluidic chips with a similar profile of a UED-coated slide. Valleys that occur between the passes of the extruder can be observed in the 3D printed surfaces, while the UED slide is relatively flat as expected

**Fig. S5** A UV-Vis trace for red light from various concentrations of calcium carbonate equivalent when titrated with a 100 ppm standard showing a linear decrease in the red intensity as recorded using an Ocean Optics USB 2000 spectrophotometer from 33 ppm to 100 ppm and steady red absorbance at higher calcium concentrations relative to the EDTA standard. The light source was centered around 600 nm.

**Fig. S6** A 125-130 ppm (as titrated) equivalent calcium carbonate composed of 90% calcium chloride and 10% magnesium chloride tested using a similar method to the one in the paper using a USB-2000 spectrophotometer at 611 nm (orange). The intercept is 121 ppm, a difference of 5-10% from the true documented range.

**Fig. S7** Buffered Eriochrome black T (approximate concentration 50 ppm) was serial diluted to demonstrate linearity across the necessary concentration range with the image processing method illustrated in the paper.



**Fig. S8** (Left) the original image of a serial dilution of 50 ppm Eriochrome black T (EBT). (Right) The gamma corrected red channel image of a pipetted serial dilution of Eriochrome black T used to create the figure in S7. The darkest drop has the initial concentration of EBT.

**ESI SV-1**: Video showing magnetically actuated dispensing on the splitting assessment chip (SAC). A side-on view of a parent droplet (100 µL) being magnetically dispensed into 4 microwells. The top plate of the chip is removed after the dispensing operation is completed to visualise the dispensed droplets. Video is accelerated 4x.

**ESI SV-2**: Video showing automated droplet dispensing on the splitting assessment chip. A 3-D printer (X,Y,Z motion capability) and associated software has been modified to magnetically manipulate a parent droplet (80 µL) into three microwells to carry out automated droplet dispensing.

**ESI SV-3**: Video showing a water hardness titration involving dispensing, actuating, merging and mixing droplets followed by colorimetric titration. The top plate of the chip is removed at the conclusion of the droplet manipulation to enable colorimetric detection (visual or with mage processing). Video is accelerated 10x.

**ESI Titration Chip:** Design file of titration chip in .STL format

**ESI Volume Test Chip:** Design file of splitting assessment chip in .STL format