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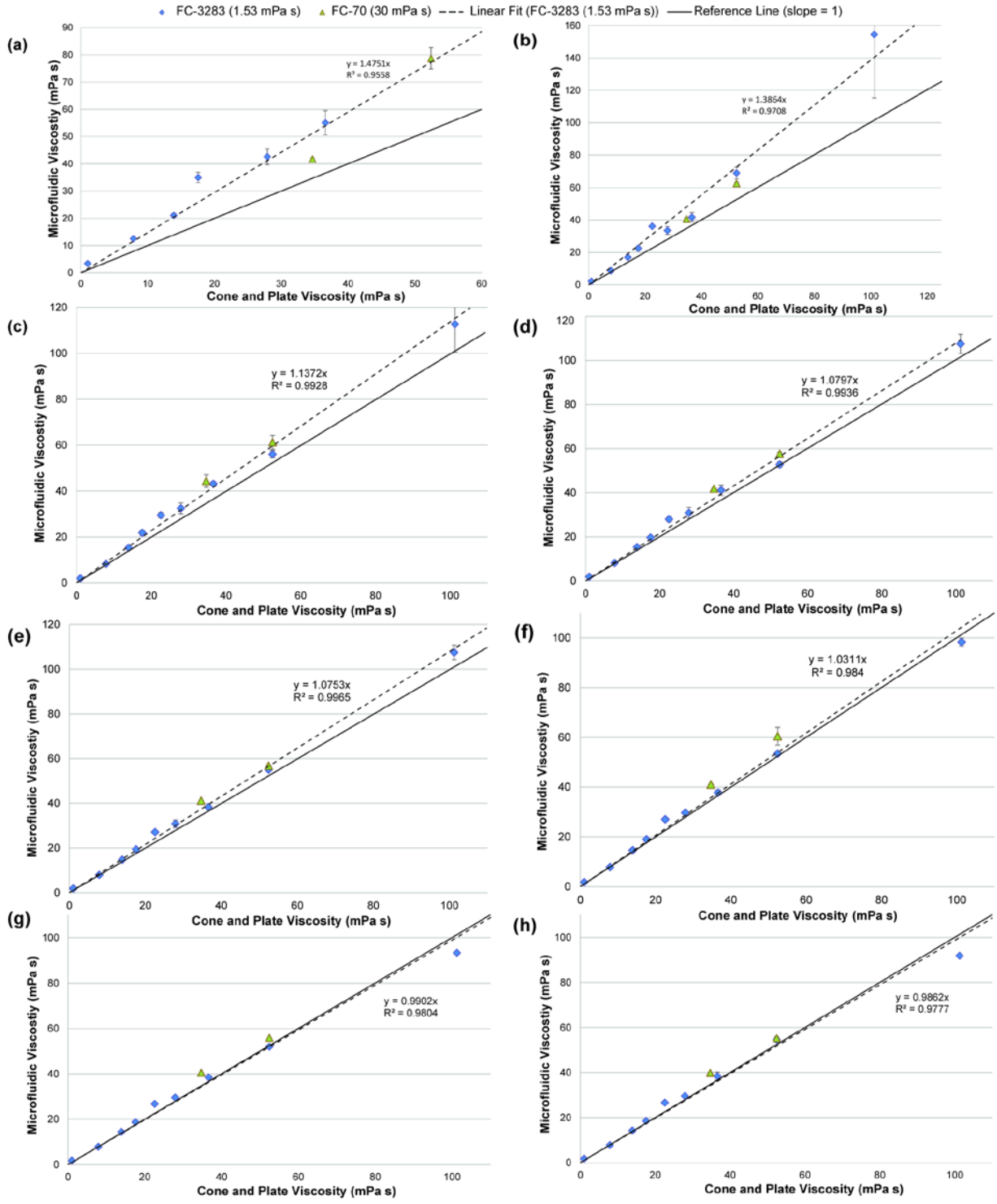
Supplementary Data



Supplementary Fig. 1 Cone-and-plate measured viscosity compared to viscosity calculated with the Hagen-Poiseuille equation from flow in the microfluidic device, driven at a) 1.2 psi, b) 2.7 psi, c) 4.0 psi, d) 5.4 psi, e) 6.7 psi, f) 8.1 psi, g) 9.5 psi, and h) 10.9 psi. All data points are the average of three runs, with error bars representing standard deviation. The dashed line is a linear best fit. The solid line is for reference and has a slope of unity. The overall trend for operation at all pressures is shown in Supplementary Figure 2.

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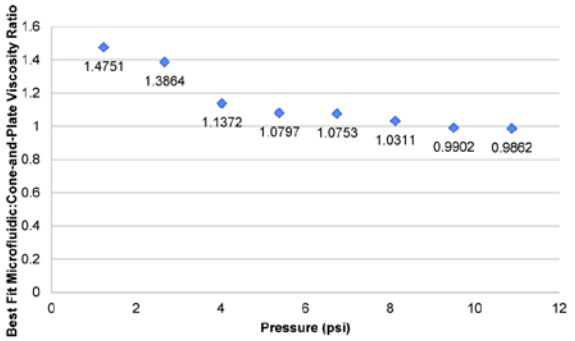

Supplementary Fig. 2 Average ratio of microfluidic viscosity to cone-and-plate viscosity for each operating pressure. Average is determined by the slope of a linear best-fit line to data such as those shown in Supplementary Figure 1.

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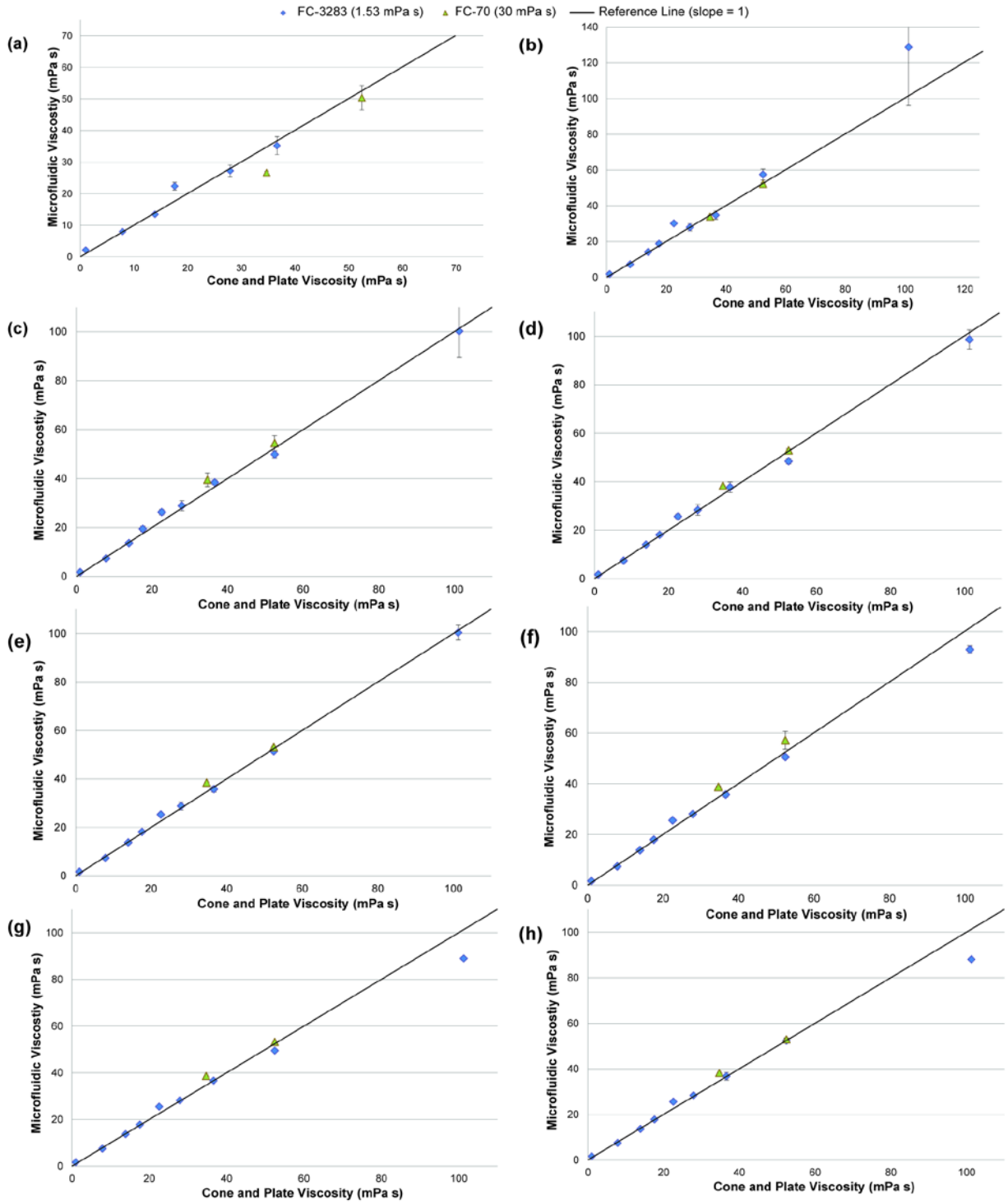

Supplementary Fig. 3 Cone-and-plate measured viscosity compared to viscosity calculated with the Hagen-Poiseuille equation from flow in the microfluidic device, driven at a) 1.2 psi, b) 2.7 psi, c) 4.0 psi, d) 5.4 psi, e) 6.7 psi, f) 8.1 psi, g) 9.5 psi, and h) 10.9 psi, with an adjustment for interfacial pressure. All data points are the average of three runs, with error bars representing standard deviation. The solid line is for reference and has a slope of unity. The overall trend for operation at all pressures is shown in Supplementary Figure 4.

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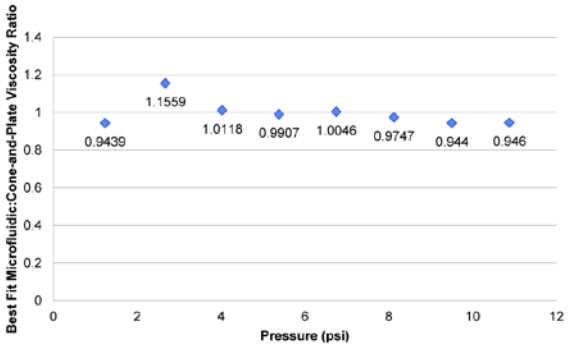
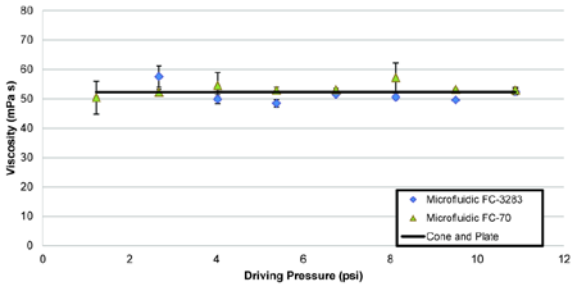


Supplementary Fig. 4 Average ratio of microfluidic viscosity to cone-and-plate viscosity for each operating pressure with an adjustment for interfacial pressure. Average is determined by the slope of a linear best-fit line to data such as those shown in Supplementary Figure 3.



Supplementary Fig. 5 Comparison of apparent viscosity of 80wt% glycerol solution with continuous oil phase of FC-3283 (1.5 mPa s) and FC-70 (30 mPa s). Theoretical and experimental analysis of a thin oil layer along the channel walls, believed to be present in many digital microfluidic applications, indicates a change in droplet flow behavior at different droplet/continuous phase viscosity ratios (34.3 for FC-3283, 1.7 for FC-70). However, the flow behavior shown here is nearly identical for the two different oils.