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Droplet-based microfluidics for high-throughput scanning of a large probe library. ADAM ABATE, DAVE WEITZ, Harvard University — Droplet-based microfluidics can produce monodisperse picoliter size microreactors at 10 kHz speed. We use this technology to prepare and fuse two drop trains. The drops in one train each contain a unique biochemical probe. The drops in the other train contain a probe target, enzymes, proteins, and other biochemical reagents that are necessary to sufficiently mimic the cellular environment. We synchronize the trains hydrodynamically and use electro-coalescence to perform high-throughput controlled fusion of one of each type of droplet microreactor. Using a multicolor laser excitation and fluorescence polarization detector we monitor each fusion event to observe the state of the probe and extract information about the target. This allows us to scan through a large probe library in a matter of seconds using less than 1μL or reagent.

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