

# Supplemental Information:

## Ultra-compact, automated microdroplet radiosynthesizer

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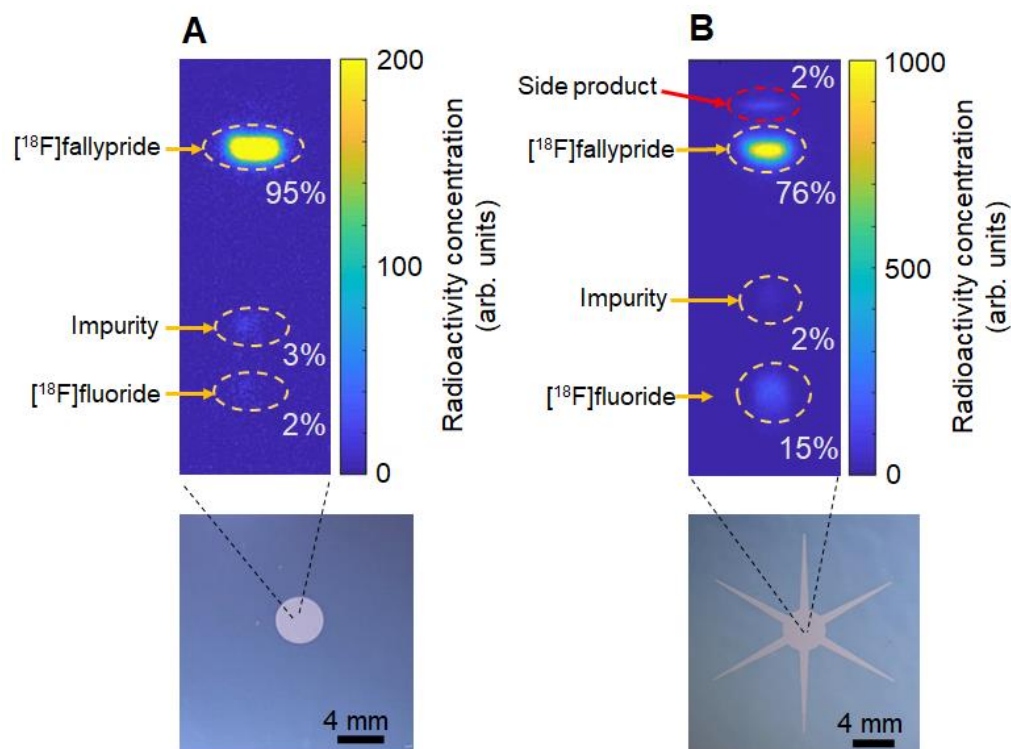
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# 1 Comparison of reactions on different types of droplet reactors

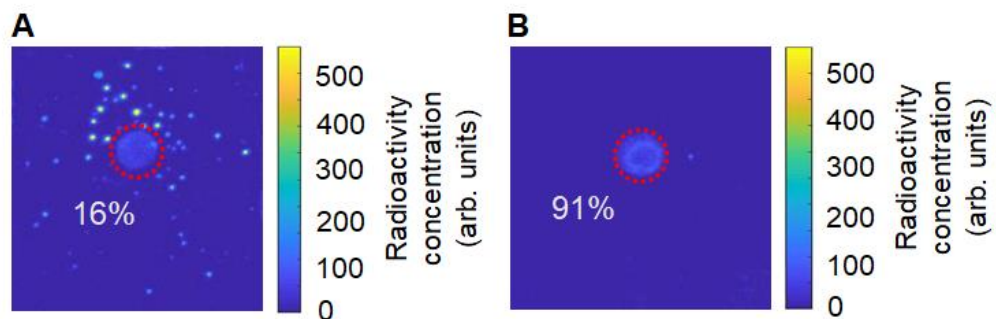


**Figure S1.** Cerenkov images of developed radio-TLC plates spotted with crude  $[^{18}\text{F}]$ fallypride product synthesized on (A) the new compact automated droplet radiosynthesizer and (B) the previous system based on “passive transport” chips.

## 2 Reagent loading protocol optimization

During the preliminary study of using the microdroplet reactor to synthesize another tracer,  $[^{18}\text{F}]$ FDOPA, we noticed signs of significant splashing of radioactivity outside of the reaction site (**Figure S2** after observing the distribution of residual radioactivity (after the collection step) on a series of microfluidic chips via Cerenkov imaging. Suspecting that the addition of collection solution with the piezoelectric dispenser (driven at 69 kPa [10. psi]) may be causing some of the contents of the chip (crude product after fluorination reaction) to splash, we repeated experiments using a lower driving pressure (35 kPa [5.0 psi]) and observed that the signs of splashing disappeared (**Figure S2B**). The initially high residual activity on the chip after collection (17%) was lowered to 5% with this change in the driving pressure.

Since all other reagents are driven at 69 kPa [10. psi] without signs of splashing, this study indicated that delivery of each reagent (or solvent) involved in the synthesis may require a little bit of optimization, to determine the best dispensing pressure, as new tracers are explored.



**Figure S2.** Activity distribution on droplet reaction chips after the collection step, visualized with Cerenkov luminescence imaging. Collection solution (80% MeOH / 20% DI water, v/v) was dispensed on the reaction site at (A) 10 psi or (B) 5 psi. The red dashed circle outlines the reaction site. Ratio of residual activity at the reaction site to total residual activity on the chip is indicated in the images.