

Supporting Information

Thermoplastic Microfluidic Devices for Targeted Chemical and Biological Applications

Dan Voicu,^a Yihe Wang,^a Michael Debono,^a Gabriella Lestari,^b Minseok Seo,^a Sangho Cho,^a and Eugenia Kumacheva,^{a,c}

S1. Calculation of volume of gas plugs in PVC and PDMS reactors

To measure the extent of nitrogen gas perfusion through the ceiling of the PVC and PDMS T-junction MF devices, we generated segmented flow of alternating water slugs and N₂ gaseous plugs, similar to our earlier work.¹ The flow was stopped and a plug, at least, 15 cm downstream of the T-junction became stationary. The length of the plug, L_p , was measured during the 5 hr time interval. To calculate the initial volume of the plug, V_0 , immediately after flow was stopped, we used the equation²

$$V_0 = H \cdot w(L_p - (H - 2d_f)) + \pi \cdot \left(w \cdot \left(\frac{H}{2} - d_f \right)^2 \right) \quad (1),$$

where V_0 is the plug volume at $t = 0$, H and w are the height and width of the microchannel, respectively ($H = 150 \mu\text{m}$, $w = 300 \mu\text{m}$), and d_f is the thickness of the liquid film surrounding the plug ($d_f = 1.5 \mu\text{m}$)². We plotted the normalized volume, V_t/V_0 , vs. time (Figure 2 in the main text of the manuscript) to compare the rate of nitrogen gas migration across the ceiling of the MF device fabricated in PDMS and PVC.

References

1. D. Voicu, M. Abolhasani, R. Choueiri, G. Lestari, C. Seiler, G. Menard, J. Greener, A. Guenther, D. W. Stephan, and E. Kumacheva, *J. Am. Chem. Soc.* 2014, **136**, 3875.
2. M. Abolhasani, M. Singh, E. Kumacheva, and A. Guenther, *Lab Chip*, 2012, **12**, 1611.