Electronic Supplementary Material (ESI) for RSC Advances

Supporting Information

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Fabrication of microfluidic device

The Figure S1 shows the schematic illustration of the fabrication process developed by our group **[1,2].** Figure S1 (A) shows a scaffold made by two tubings of different sizes. This framework was completely immerged in precursor of perfluoro polyether, followed by curing as described elsewhere **[2].** After curing, the devices were cut and the template was simply removed from the polymer matrix to make a solvent-resistant fluoropolymer microchannels (Fig. S1 (B)).

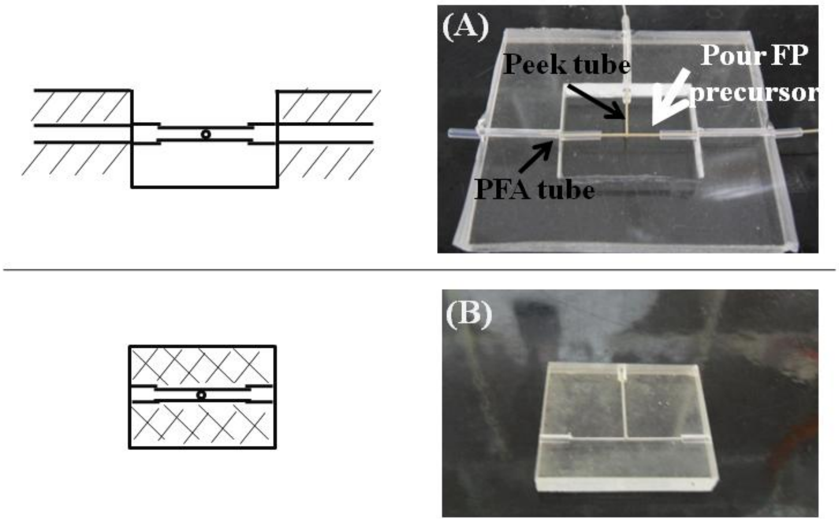


Figure S1. Schematic illustration for the fabrication process of a microfluidic device; (A) PFA and PEEK capillary assembly were placed on a PDMS mold, followed by pre-polymer pouring and curing, (B) fluoropolymer (FP) microfluidic device after removal of templates.

For comparison, LTA zeolite was prepared by continuous flow capillary microreactor with no use of lab-on-a chip droplet generator, and a bulk reaction under similar synthetic conditions.

Reference

1. Hoang. P. H.; Nguyen. C. T.; Perumal. J.; Kim. D. P. *Lab Chip*, **2011,** 11, 329-335.
2. Asthana. A.; Kim. K. O.; Perumal. J.; Kim. D. M.; Kim. D. P. *Lab Chip*, **2009**, 9, 1138-1142.

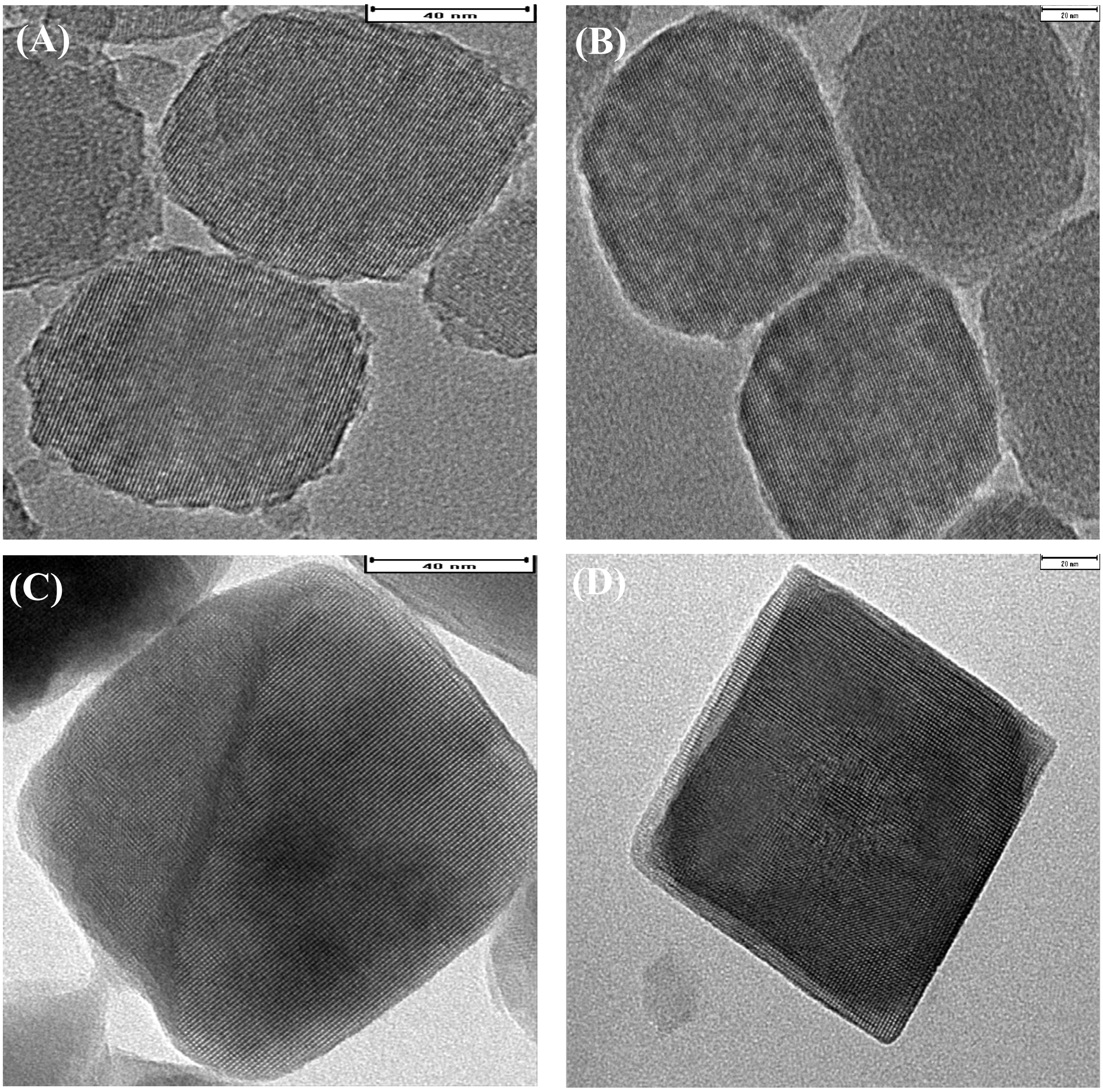


Figure S2. TEM images of LTA zeolite synthesized in a droplet-based microreactor with various retention times, (a) 3, (b) 6, (c) 12, and (d) 25 min.

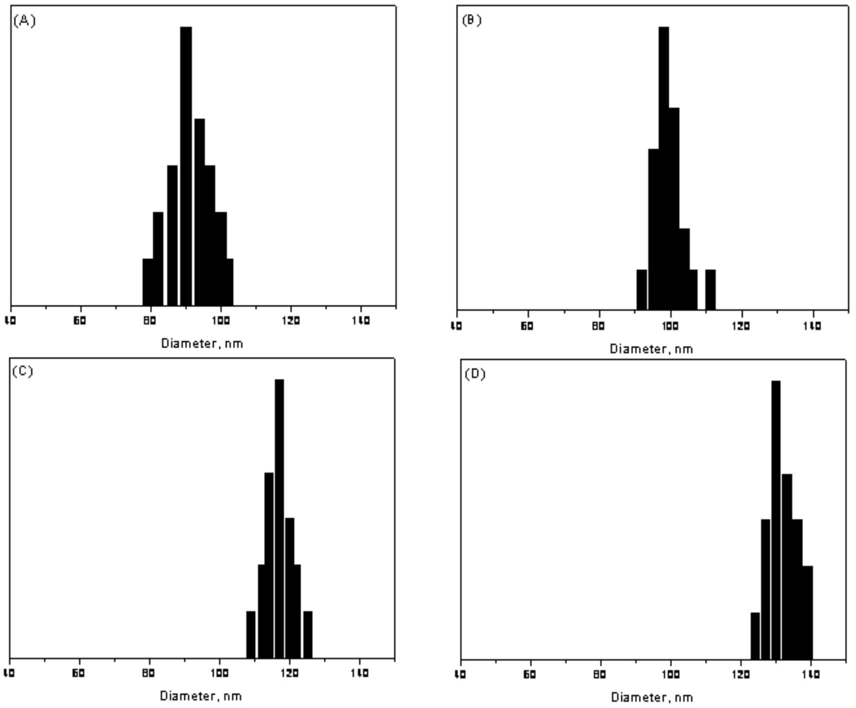


Figure S3. Particle size distribution of zeolite A crystals synthesized in a droplet microreactor for various residence time: (A) 3, (B) 6, (C) 12, and (D) 25 min.

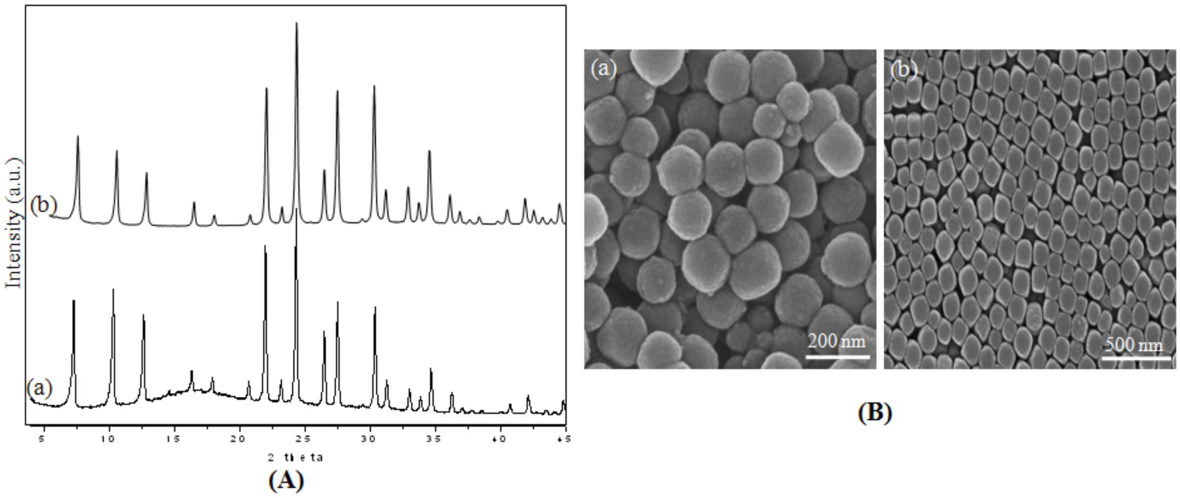


Figure S4. (A) XRD pattern of the zeolite A sample synthesized in a droplet microreactor with various reaction time (a) 6 min (b) 12 min reaction time. (B) SEM images of the zeolite A sample synthesized in a droplet microreactor with various reaction time (a) 6 min (b) 12 min reaction time.

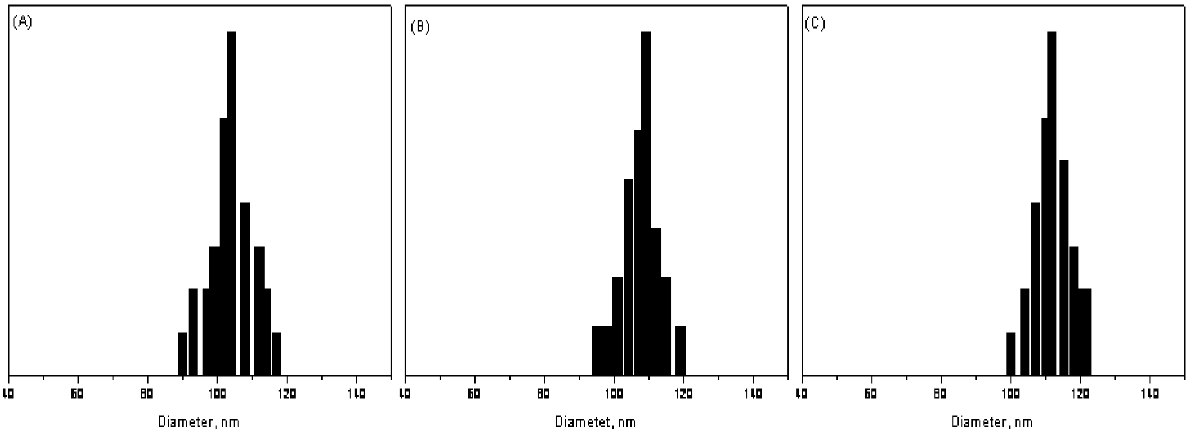
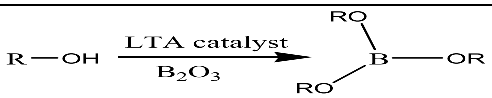


Figure S5. Particle size distribution of mesoporous LTA-*m* zeolite crystals synthesized in a droplet microreactor for 12 min reaction time by addition of various amounts of alginate: *m* = 0.004 (A), 0.002 (B), and 0.001 (C).

Table S1. Water uptake (WU) ability of LTA zeolite samples with various amounts of alginate addition, synthesized in a droplet microreactor for 12 min reaction time and calcined at 550 °C in air.

Sample	WU ability (%) at different temperature			
	60 °C	70 °C	80 °C	90 °C
LTA-0	28.6	29.3	30.1	30.5
LTA-01	36.2	36.8	37.7	39.0
LTA-02	39.6	40.9	41.5	42.9
LTA-04	42.3	43.0	43.8	45.4

Table S2. Catalytic efficiency of second used of mesoporous LTA zeolite samples, which were synthesized in a droplet microreactor for 12 min reaction and calcined at 550 °C in air, for alkyll borate synthesis.



Reaction time	Conversion of alcohol[a] (%)			
	LTA-01	LTA-02	LTA-04	LTA-0
10 min	37.7 (33.1)	42.1 (39.6)	47.3 (43.8)	20.7 (15.2)
20 min	-	-	-	-
30 min	64.1 (59.5)	66.0 (62.7)	67.4 (65.1)	37.1 (30.8)
3 hrs	65.5 (62.4)	68.6 (66.3)	69.4 (67.9)	40.8 (35.6)

[a] Conversion of 2-propanol, measured by ^{1}H-NMR

( ) conversion of n-butanol