

Microwave assisted synthesis of silicalite - Power delivery and energy consumption

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Table S1 Reaction temperature programs used in the microwave oven for the synthesis of silicalite.

An intermediate temperature ramp rate			A slow temperature ramp rate		
Temperature (°C)	Ramp rate (°C/min)	Ramp time (min)	Temperature (°C)	Ramp rate (°C/min)	Ramp time (min)
25~108	8.30	10	25~100	4.41	17
108~120	4.00	3	100~120	2.00	10
120~140	2.50	8	120~130	1.43	7
140~145	0.83	6	130~140	0.77	13
145~150	0.15	33	140~150	0.43	23

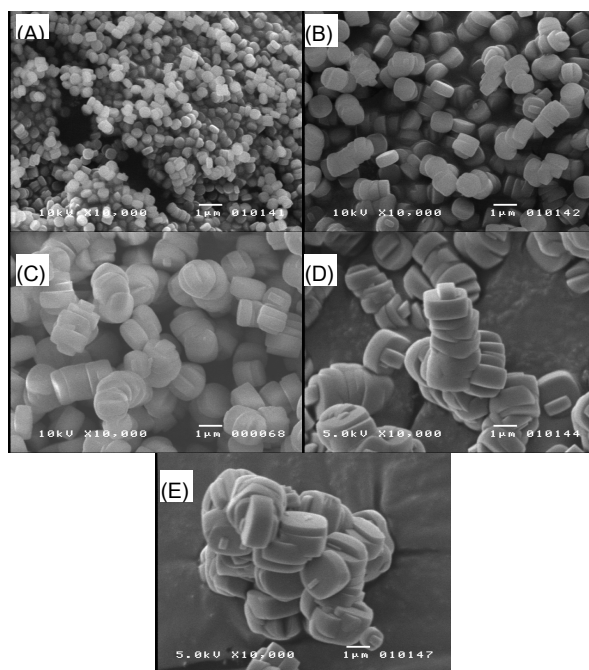


Fig. S1 SEM photographs of silicalites synthesized in the microwave oven with a fast temperature ramp rate for (A) 30 min, (B) 60 min, (C) 90 min, (D) 120 min, and (E) 150 min.

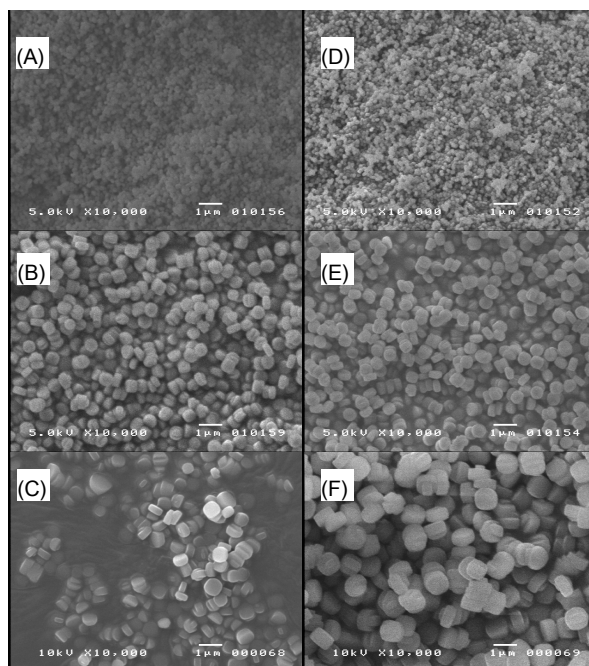


Fig. S2 SEM photographs of silicalites synthesized in ethylene glycol bath for (A) 35 min, (B) 60 min, and (C) 90 min and in the microwave oven with an intermediate temperature ramp rate for (D) 35 min, (E) 60 min, and (F) 90 min.

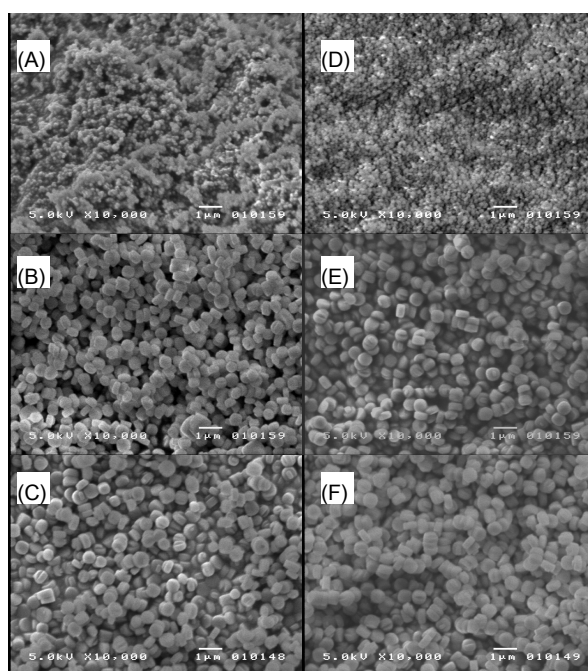


Fig. S3 SEM photographs of silicalites synthesized in electric oven for (A) 55 min, (B) 80 min, and (C) 90 min and in the microwave oven with a slow temperature ramp rate for (D) 55 min, (E) 80 min, and (F) 90 min.

Table S2 Comparison of parameters in microwave and conventional heating systems

System	MARS®-5	Ethylene glycol bath with heating mantle	Blue-M oven
Manufacturer	CEM Corp., Mathews, NC	Chem Glass Inc.	Stabiltherm
Description	Microwave oven	Thermal mantle and bath	Thermal oven
Cavity volume	420 (width) × 340 (depth) × 330 (height) mm = 47.124 L	1L cylindrical glass vessel with 0.6 L of ethylene glycol	330 (width) x 310 (depth) x 305 (height) mm = 31.20 L
Max. power	1200 W	300 W heater	1200 W (heaters) and fan and controller
Max. power density	25.5 WL ⁻¹	67.5 WL ⁻¹	38.5 WL ⁻¹
Magnetron	One magnetron	-	-
Irradiation mode	Multimode	-	-
Power delivery	Controlled to match temperature variable power between 0 and 300 W	PID control, bath temperature preset	PID control to set temperature
Reactor type	33mmID, 100 mL vessel	Same as left	Same as left
Temperature measurement	Fiberoptic probe in a sapphire thermowell	K-type thermocouple	K-type thermocouple
Program	2 min ramp, hold for varying times up to 120 min	Approx. 45 min ramp to hold temperature, preheated bath	Approx. 15 min to hold temperature, oven preheated
Max. temp.	150°C	150°C	150°C
Max pressure	90 psi at 150°C	Same as left	Same as left
Average power	850 W ramp, 250W steady state	280 W ramp, 150W steady state	1300 W ramp, 600W steady state
Quantity of reactant	20g	20g	20g