Supporting Information

Photodimerization of Maleic Anhydride in a Microreactor Without Clogging

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Typical procedure of single flow reaction: Maleic anhydride 10 g was dissolved in ethyl acetate 90 g previously. When a FEP tube of OD = 1.4 mm, ID = 0.8 mm, L = 13.9 m was used as a reactor, the solution was fed by plunger pump at the flow rate of 0.50 ml/min. and mixed with pressure regulated N_2 gas (1.0 MPa) at T connector. N_2 gas flow rate was controlled in exactly by needle valve as the liquid segments length became 2 cm and gas segments length became 0.5 cm. In the condition, the liner velocity of the N_2 segment was 2.13 cm/sec. and the residence time was calculated to 10.9 min. After two hours operation, 55.46 g of the suspension was collected. The suspension was condensed under reducing pressure to remove volatile materials, and then cooled to room temperature. After filtration and drying in a vacuum drying oven (60°C), CBTA 2.15 g was obtained. The conversion was determined by the weight of CBTA to be 39 %. The data of using another size of tubes were given in from Table S-1 to Table S-6.

Table S-1. The flow reaction using a FEP tube size of O.D. 1.0 mm I.D. 0.5 mm Length 19.2 m (2 h.)

flow rate (ml / min)	liner velocity (cm / sec.)	residence time (min.)	solution (g)	CBTA (g)	conversion (%)	efficiency (W / mmol)
0.40	5.89	5.40	43.9	1.42	32	55.24
0.20	2.63	11.8	22.3	1.20	54	65.37
0.10		clogging				

Table S-2. The flow reaction using a FEP tube size of O.D. 1.4 mm I.D. 0.8 mm Length 13.9 m (2 h.)

flow rate (ml / min)	liner velocity (cm / sec.)	residence time (min.)	solution (g)	CBTA (g)	conversion (%)	efficiency (W / mmol)
0.50	2.13	10.9	55.5	2.15	39	36.49
0.40	1.69	13.7	44.5	2.08	47	37.71
0.20	1.06	21.8	22.1	1.54	70	50.94

Table S-3. The flow reaction using a FEP tube size of O.D. 1.4 mm I.D. 1.0 mm Length 13.6 m (2 h.)

flow rate (ml / min)	liner velocity (cm / sec.)	residence time (min.)	solution (g)	CBTA (g)	conversion (%)	efficiency (W / mmol)
0.70	1.69	13.4	78.1	2.58	33	30.41
0.35	0.98	23.1	38.8	2.03	52	38.64

Table S-4. The flow reaction using a FEP tube size of O.D. 1.6 mm I.D. 1.0 mm Length 11.2 m (2 h.)

flow rate (ml / min)	liner velocity (cm / sec.)	residence time (min.)	solution (g)	CBTA (g)	conversion (%)	efficiency (W /mmol)
0.70	1.69	11.0	77.7	2.20	28	35.66
0.50	1.20	15.5	55.7	2.31	42	33.96
0.40	0.99	18.9	43.6	2.25	52	34.86
0.30	0.80	23.1	29.6	1.80	61	43.58

Table S-5. The flow reaction using a FEP tube size of O.D. 1.6 mm I.D. 1.2 mm Length 11.2 m (2 h.)

flow rate (ml / min)	liner velocity (cm / sec.)	residence time (min.)	solution (g)	CBTA (g)	conversion (%)	efficiency (W /mmol)
1.00	1.69	11.0	110.9	2.60	23	30.17
0.70	0.92	20.2	56.1	2.69	48	29.16

Table S-6. The flow reaction using a FEP tube size of O.D. 3.2 mm I.D. 1.6 mm Length 6.4 m (2 h.)

flow rate (ml / min)	liner velocity (cm / sec.)	residence time (min.)	solution (g)	CBTA (g)	conversion (%)	efficiency (W /mmol)
2.00	1.88	5.7	222.9	2.80	13	28.02
1.00	0.96	11.1	110.8	2.70	24	29.05
0.50	0.50	21.3	54.7	2.48	45	31.63

SEM analysis: The particle size of CBTA synthesized with the tube size of tube I.D. = 0.8 mm (residence time: 18.1 min.) was analyzed by SEM (JEOL : JSM-7401F Nisso Chemical Analysis Service Co.,Ltd). Small hexagonal plate particle (14 μm at long axis) was observed. Particle size distribution has not analyzed, but various particle sizes were observed by SEM.