

Supporting Information

Microcapsule-based Reusable Self-reporting System using Donor-Acceptor Stenhouse Adduct

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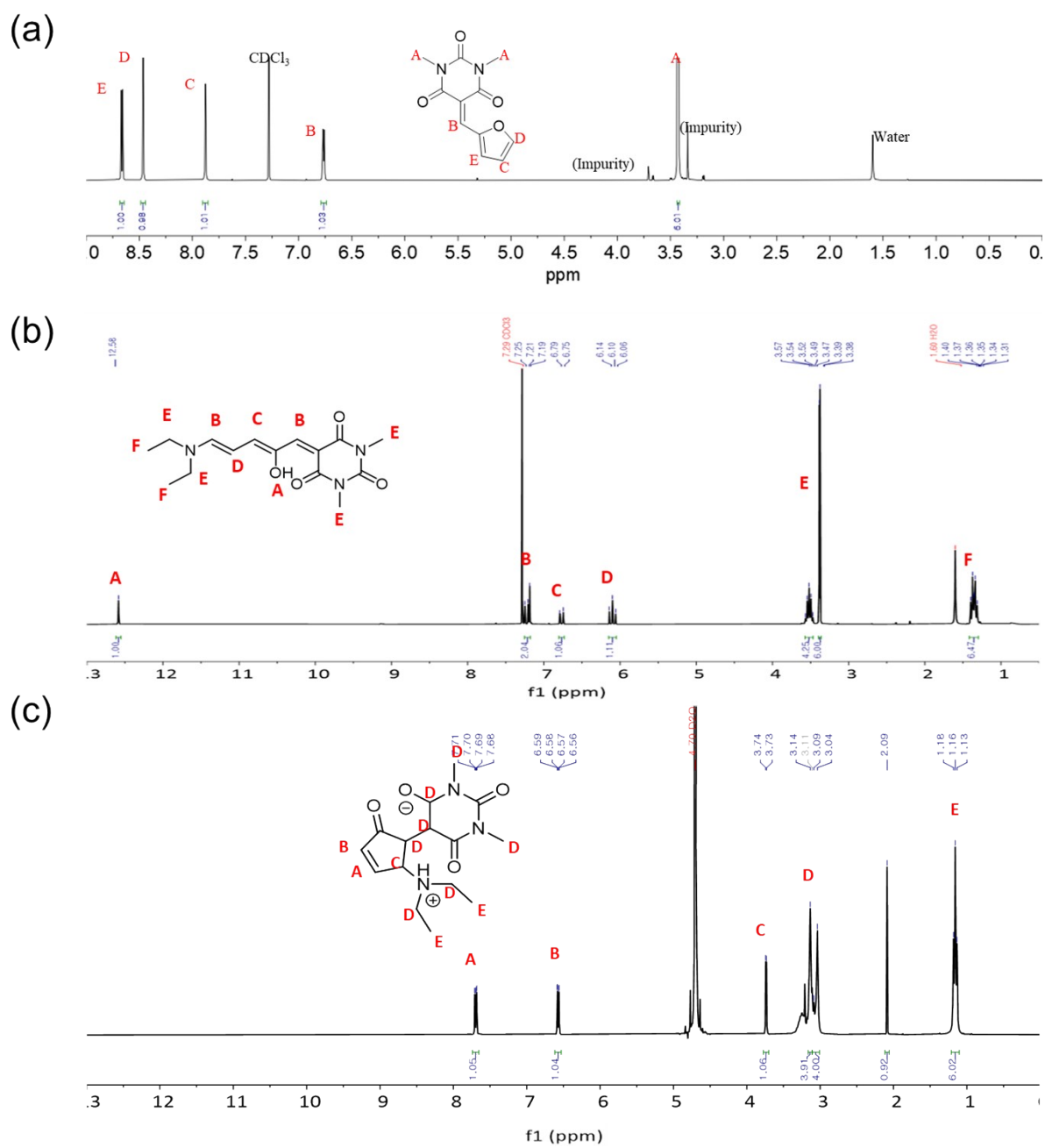


Figure S1. $^1\text{H-NMR}$ spectra of (a) DASA precursor (b) the linear DASA and (c) the cyclic DASA

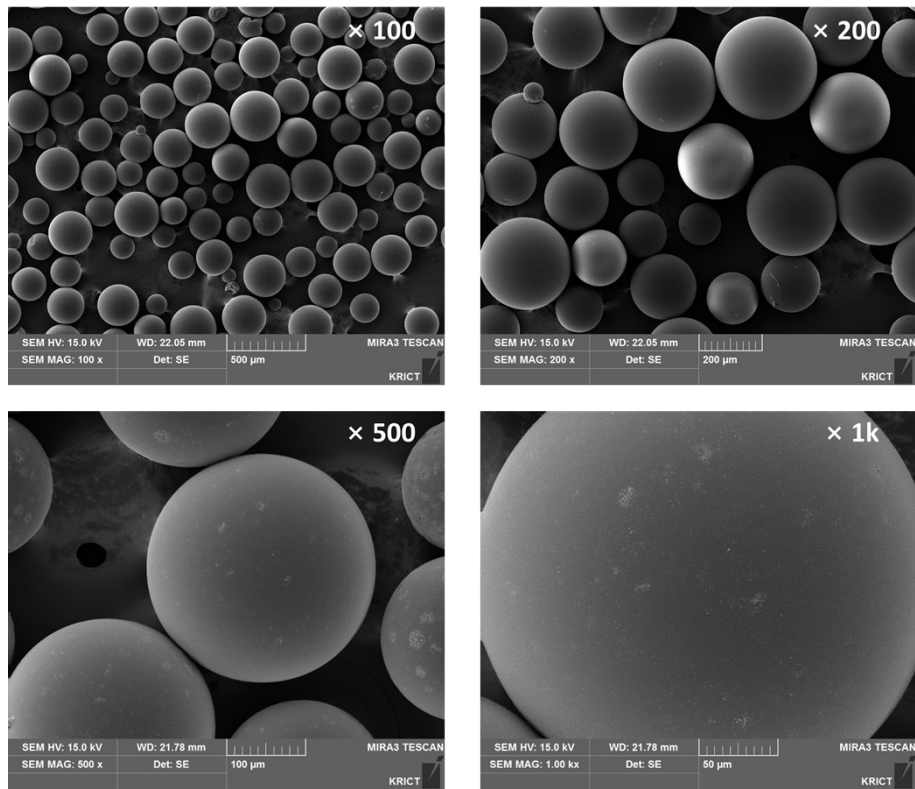


Figure S2. SEM image of microcapsules obtained at optimum condition

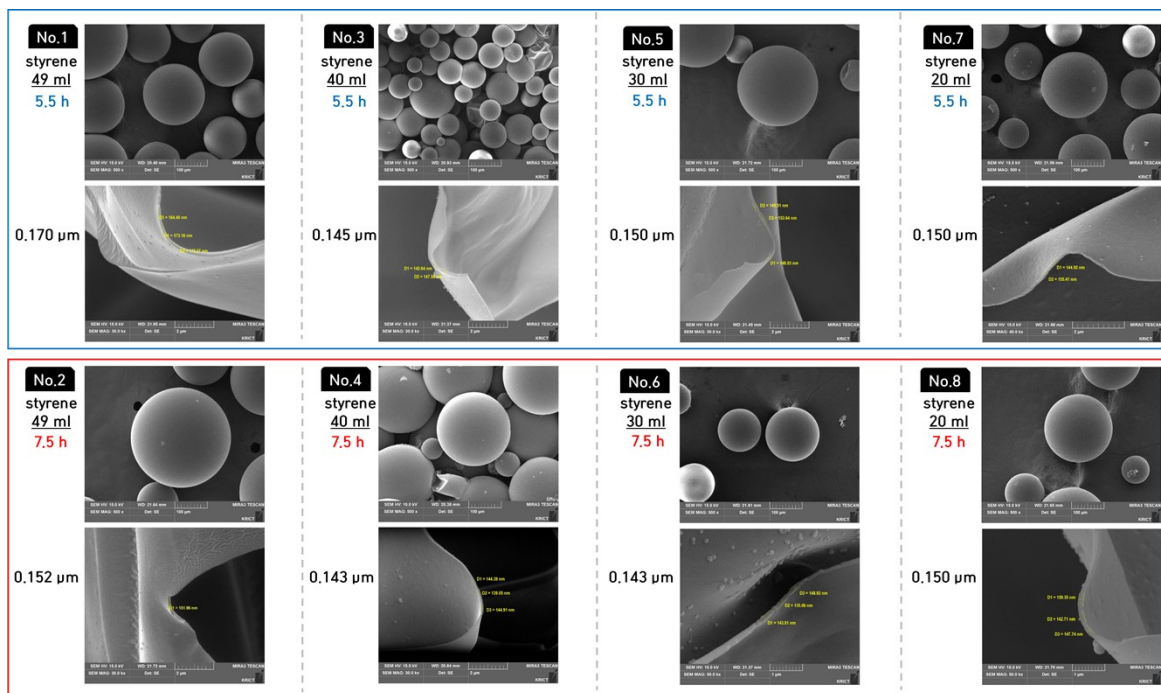


Figure S3. Surface and shell morphology of microcapsules obtained at various styrene amounts and reaction times.

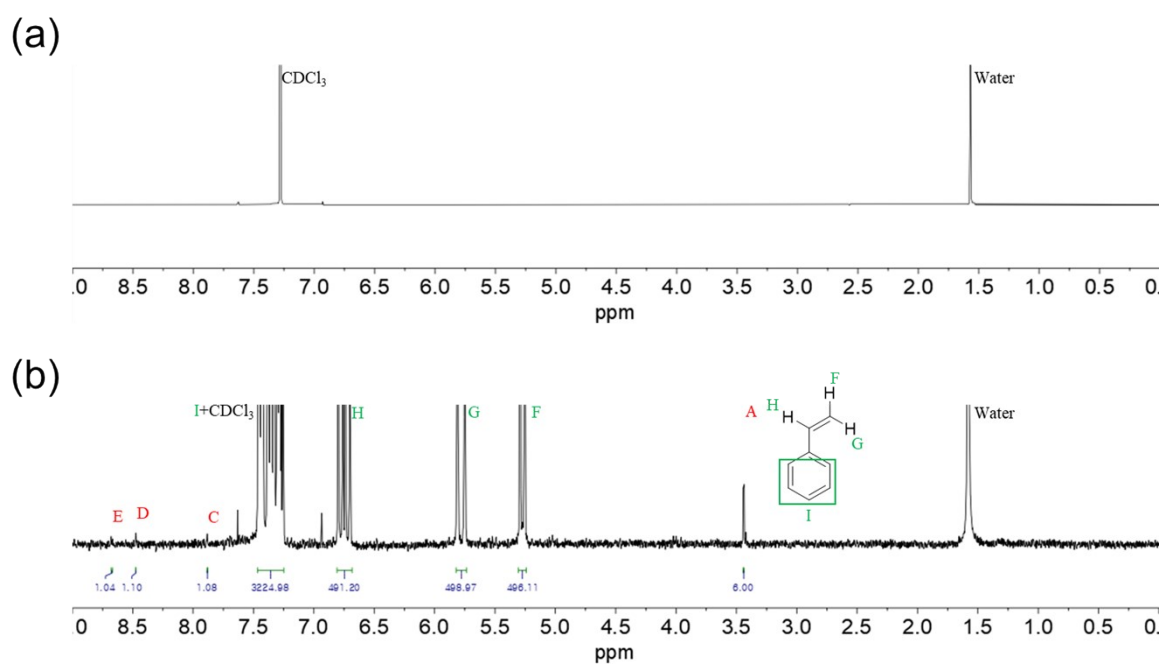


Figure S4. $^1\text{H-NMR}$ spectra of the microcapsules (a) before and (b) after crushing.

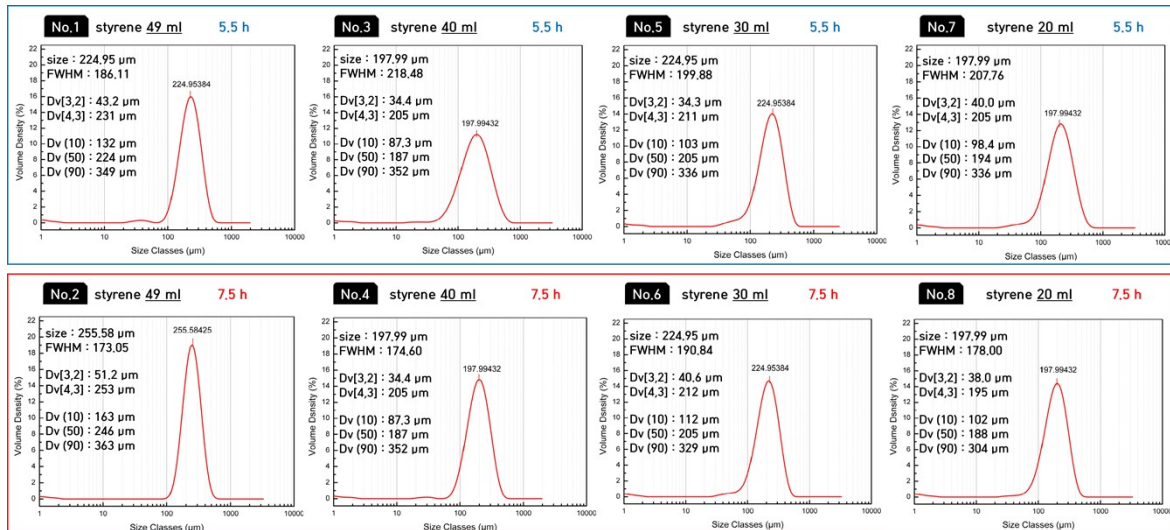


Figure S5. Particle size distribution of microcapsules obtained at various styrene amounts and reaction times.

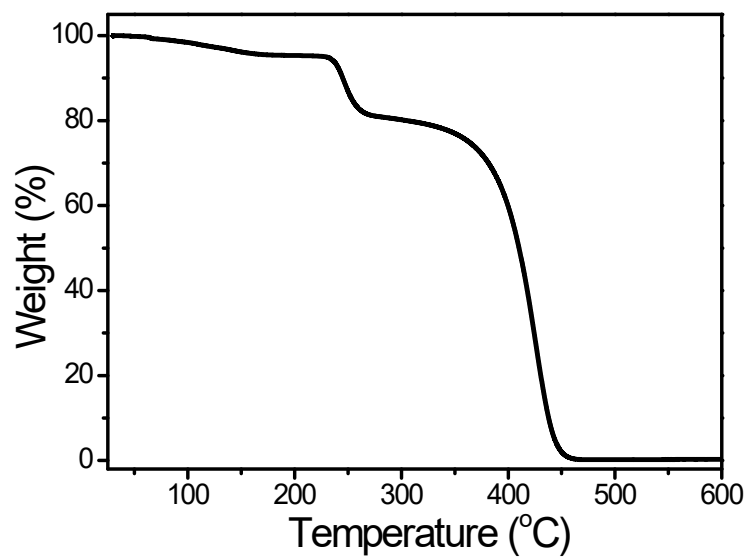


Figure S6. TGA diagram of the microcapsules.

Table S1. General(optimum) preparation condition for microcapsules

	Urea	Resorcinol	37 wt%	NH₄Cl	Styrene	DASA
	Formaldehyde					
mol ratio	1	0.0543	2.13	0.111	10.2	0.00842
MW(g/mol)	60.06	110.11	30.03	53.49	104.15	284.32
Mol	0.0418	0.00227	0.0892	0.00467	0.428	0.000352
weight (g)	2.51	0.250	2.68	0.250	44.54	0.200
	(solution:7.19)					

A 2.5 wt% aqueous solution of EMA (40 mL) was added to distilled water (85 mL), to which urea (2.51 g), resorcinol (0.25 g), and ammonium chloride (0.25 g) were then added with stirring. The pH of the resultant solution was adjusted to 3.5 using a 10% NaOH solution. One drop of 1-octanol was then added to this solution to eliminate surface bubbles. The resulting mixture was agitated at 500 rpm, and to the stirred solution was added 44.74 g of the core material, which consisted of DASA (0.2 g) and styrene (44.54 g = 49 mL) with a weight ratio of 1:220.61. To the agitated emulsion was added a 37 wt% formaldehyde (7.190 g, 0.0892 mol) solution, and the temperature of the resulting mixture was raised to 55°C, and heated at that temperature for 5.5 h. The reaction mixture was cooled to room temperature, and the microcapsules were separated using vacuum filtration. The microcapsules were washed with acetone and dichloromethane and then air-dried.

Table S2. Parameters of the microcapsules synthesized at different reaction conditions

Entry	rpm	D.W. (mL)	EMA (mL)	Styrene (mL)	Reaction time (h)	mean size (μm)	shell thickness (μm)	Yield (%)	FWHM
1	500	85	40	49	5.5	224.95	0.170	61.84	186.11
2	500	85	40	49	7.5	255.58	0.151	58.82	173.05
3	500	85	40	40	5.5	197.99	0.145	55.08	218.48
4	500	85	40	40	7.5	197.99	0.143	55.26	174.60
5	500	85	40	30	5.5	224.95	0.146	48.52	199.88
6	500	85	40	30	7.5	224.95	0.15	50.89	190.84
7	500	85	40	20	5.5	197.99	0.174	32.36	207.76
8	500	85	40	20	7.5	197.99	0.15	34.70	178.0