Electronic Supplementary Information for:

Atom-economical *in situ* synthesis of $BaSO_4$ as imaging contrast agents within poly(*N*-isopropylacrylamide) microgels using one-step droplet microfluidics

Qin Wang,[a] Di Zhang,[b] Xiangliang Yang,[c] Huibi Xu,[c] Amy Q. Shen[b]* and Yajiang Yang[a]*

[a] *School of Chemistry and Chemical Engineering, Huazhong University of Science and Technology, Wuhan 430074, China. Fax:+86-27-87543632 Tel: +86-27-87547141; E-mail:yjyang@hust.edu.cn*
[b] *Mechanical Engineering, University of Washington, Seattle, Washington 98195, USA. Fax: +01-206-221-0372; Tel: +01-206-685-8047; E-mail: amyshen@uw.edu*
[c] *College of Life Science and Technology, Huazhong University of Science and Technology, Wuhan 430074, China*

Supplementary data

In our adopted recipe in the manuscript, the concentrations of the NIPAM, APS and TEMED were selected (recipe 3 in the table below) based on the approximate gelation time within 1 min at room temperature when a transparent gel in bulk appears by mixing two dispersed aqueous solutions. The entries were listed in Table S1 below (room temperature). With the increasing concentration of APS and TEMED, the gelation time decreased down to ~0.75 min. However, when we increased the concentration of NIPAM, APS and TEMED further, a turbid inhomogeneous gel formed due to rapid polymerization, which is not desirable for our application.[s1] We also explored the option of adding Na_2SO_4 (0.05 mol·L^{-1}) into the dispersed phase containing APS (entry 4). In this case, the gelation time increased due to the presence of SO_4^{2-}, which hindered the initiation reaction. Based on these trials, recipe 3 was eventually adopted in our experiments.

Table S1 Feed ratio of polymerization and gelation time of microgels

Entries	C_{NIPAM} (wt%)	C_{TEMED} (wt%)	C_{APS} (wt%)	Gelation time (min)
1	8	1.5	1	~2
2	8	3	1	~1
3	8	3	2	~0.75
4	8	3	2*	~ 1

* added 0.05 mol·L^{-1} Na_2SO_4 in the dispersed phase containing APS.

Additional Reference

S1 S. Seiffert and D.A. Weitz, *Soft Matter*, 2010, **6**, 3184-3190.