

## Electronic Supplementary Information

### Production of ultra-high concentration calcium alginate beads with prolonged dissolution profile

Wan-Ping Voo<sup>a</sup>, Boon-Beng Lee<sup>b</sup>, Ani Idris<sup>c</sup>, Aminul Islam<sup>d,e</sup>, Beng-Ti Tey<sup>a,f</sup>, Eng-Seng Chan<sup>\*a,f</sup>

<sup>a</sup>*Chemical Engineering Discipline, School of Engineering, Monash University Malaysia, Jalan Lagoon Selatan, 46150 Bandar Sunway, Selangor, Malaysia.*

<sup>b</sup>*School of Bioprocess Engineering, Universiti Malaysia Perlis, 02600 Arau, Perlis, Malaysia.*

<sup>c</sup>*Department of Bioprocess Engineering, Faculty of Chemical and Natural Resource Engineering, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.*

<sup>d</sup>*Catalysis and Science Research Center, Faculty of Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.*

<sup>e</sup>*Department of Chemistry, Faculty of Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.*

<sup>f</sup>*Multidisciplinary Platform of Advanced Engineering, Monash University Malaysia, Jalan Lagoon Selatan, 46150 Bandar Sunway, Selangor, Malaysia.*

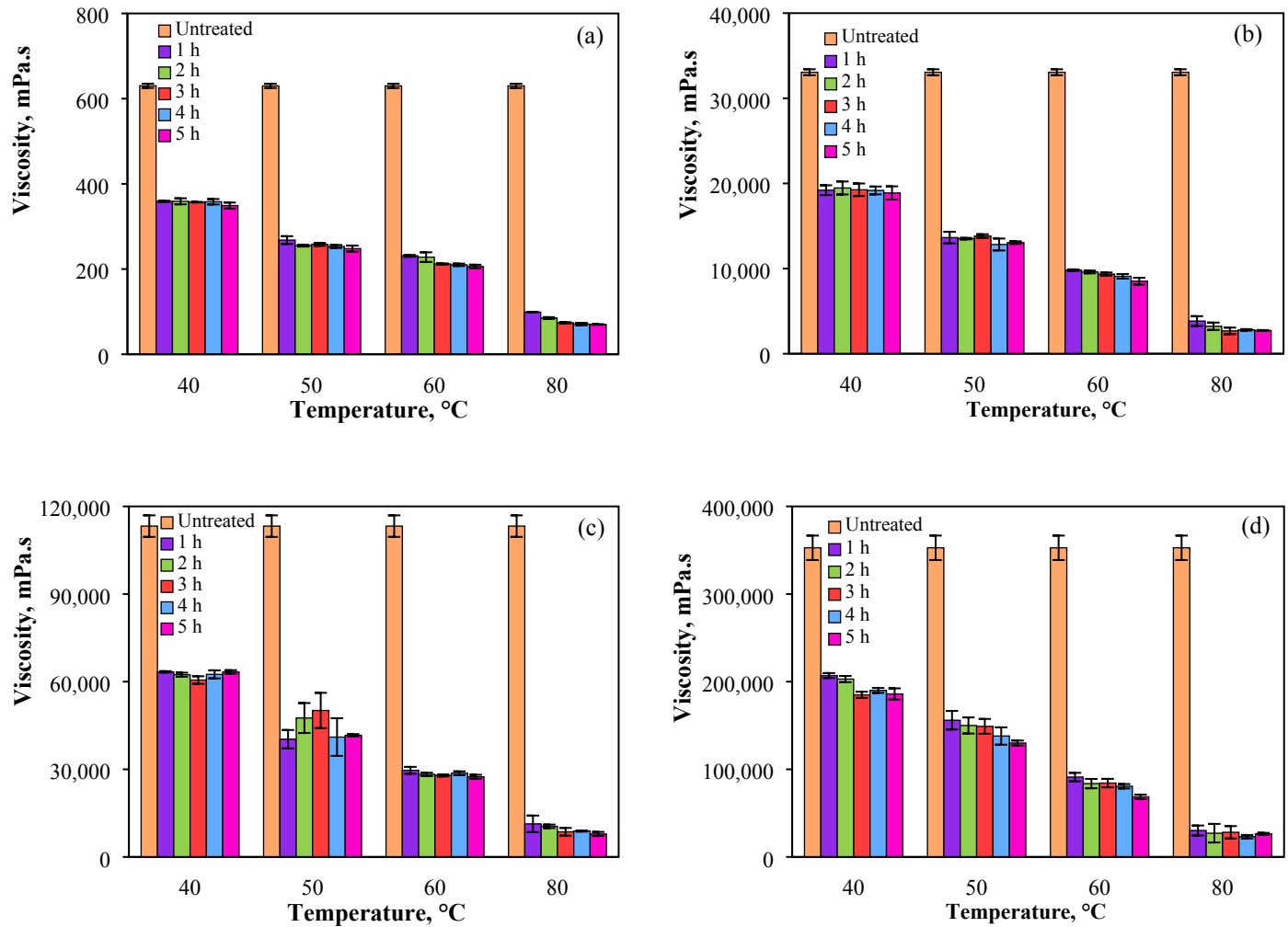
\*Corresponding author

Tel: (+603)55145821; Fax: (+603)55146207

E-mail: chan.eng.seng@monash.edu

## 1. Effect of heating on viscosity

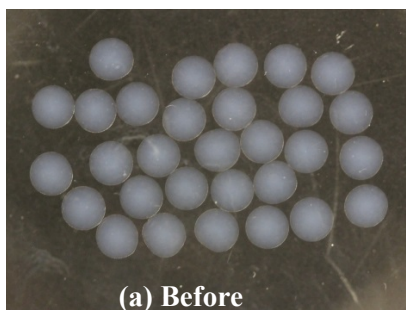
Fig. S1 shows the viscosity of 2% w/v, 6% w/v, 8% w/v and 10% w/v alginate solution at temperature between 40°C and 80°C. The viscosity of alginate solutions reduced substantially when temperature increased. The viscosity of solutions reached a plateau after 1 h of heating and it decreased only slightly when the solutions were heated further.



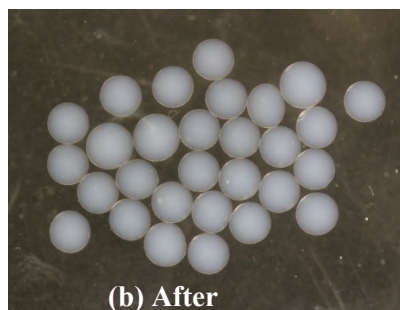
**Fig. S1** The changes of viscosity of alginate solution with concentration of (a) 2% w/v, (b) 6% w/v, (c) 8% w/v and (d) 10% w/v after heating for 5 h at different temperatures. Error bars show the standard deviation of the mean of duplicate experiments.

## 2. Effect of simulated gastric fluid on calcium alginate beads

A simple test was done by incubating 30 calcium alginate beads into 900 ml of simulated gastric fluid (pH 1.2) for 2 h at 37°C. Dissolution apparatus Type 1 was used and stirred at 100 rpm. Fig. S2 and S3 show that the calcium-alginate beads, regardless of the alginate concentration, remained intact after incubation in the simulated gastric fluids.

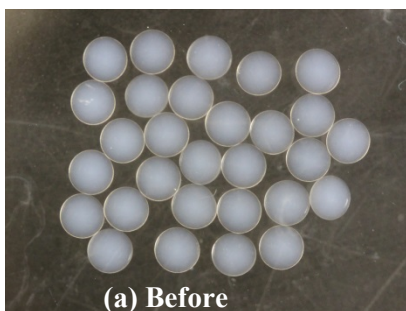


(a) Before

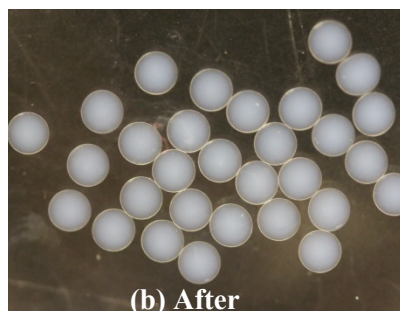


(b) After

**Fig. S2** The 2% w/v calcium alginate beads (a) before and (b) after incubated in the simulated gastric fluid (pH 1.2) for 2 hours.



(a) Before



(b) After

**Fig. S3** The 6% w/v calcium alginate beads (a) before and (b) after incubated in the simulated gastric fluid (pH 1.2) for 2 hours.