

SUPPLEMENTARY MATERIALS

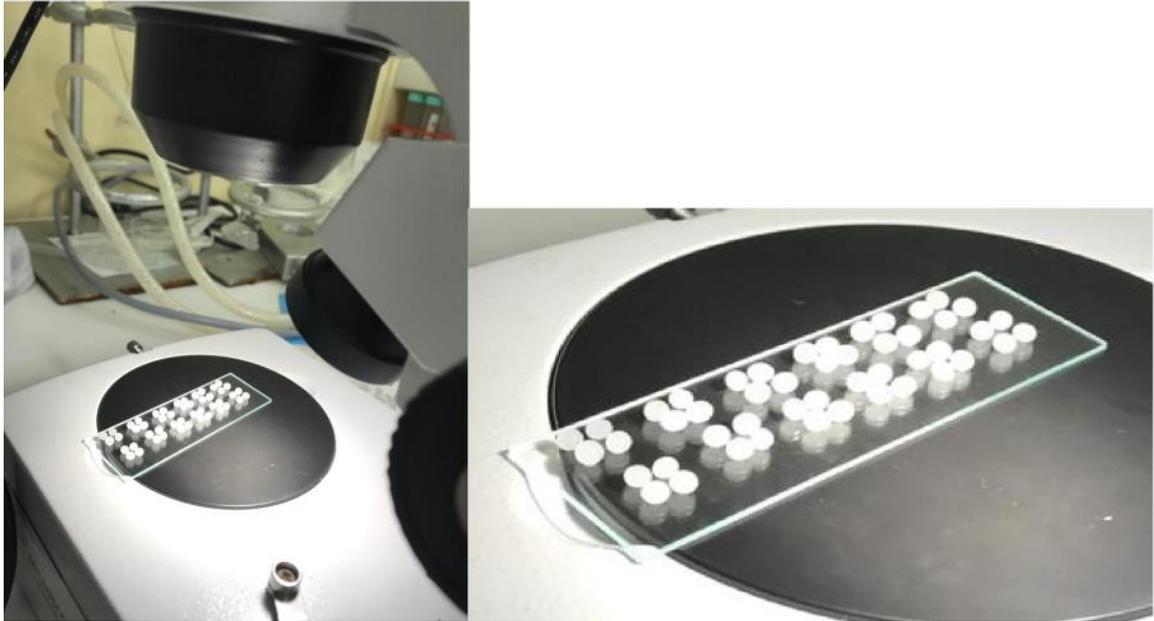
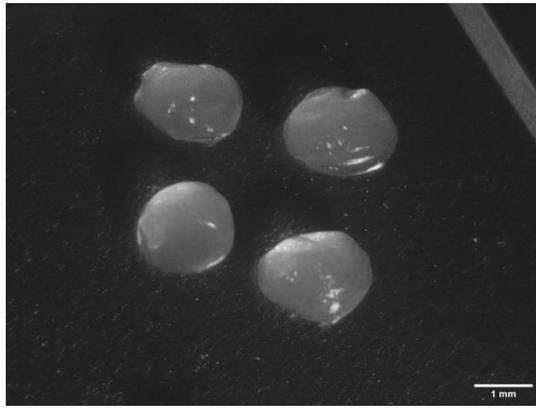
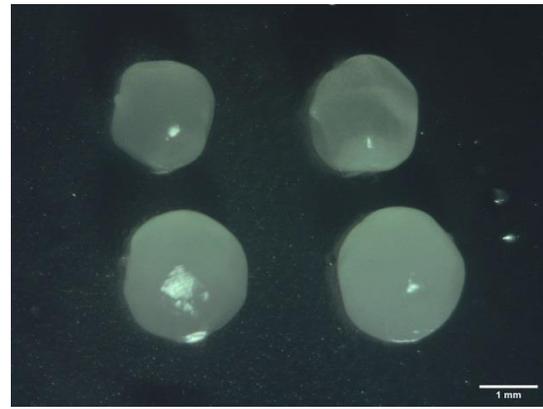


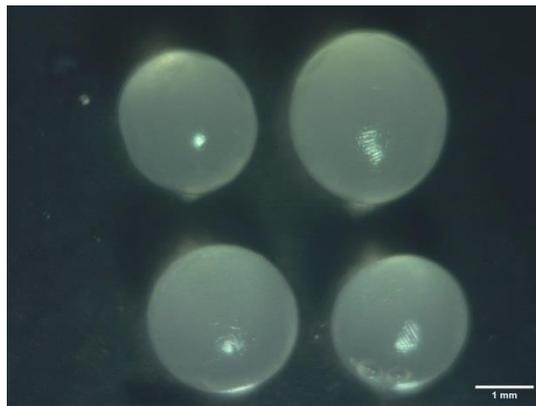
Figure S1. Photographs of the calcium alginate-cornstarch hydrogel beads filled with sucrose/acid gallic solution or cryoconcentrated solution.



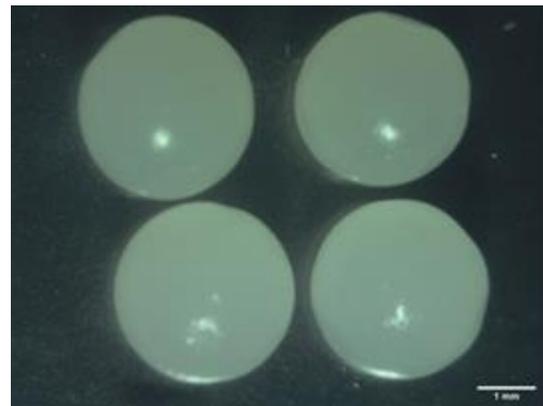
(a)



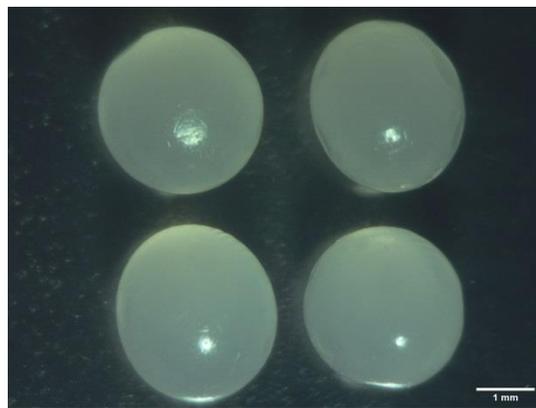
(b)



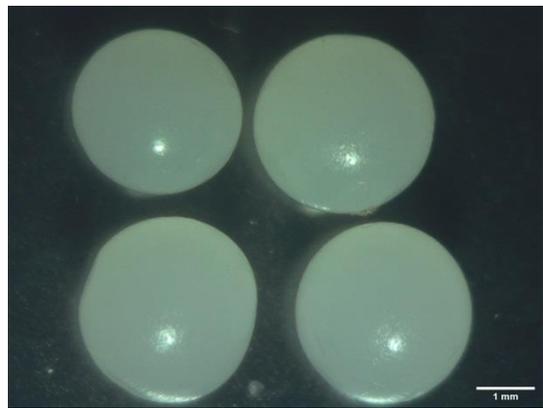
(c)



(d)

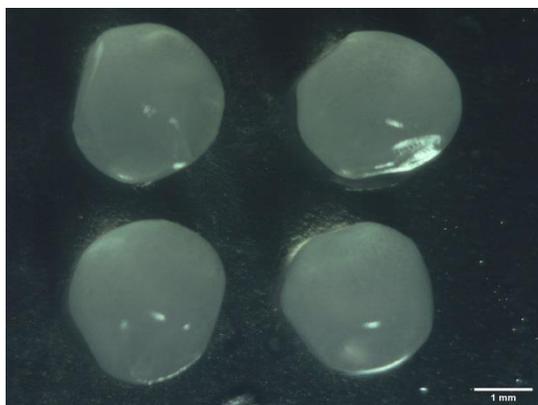


(e)

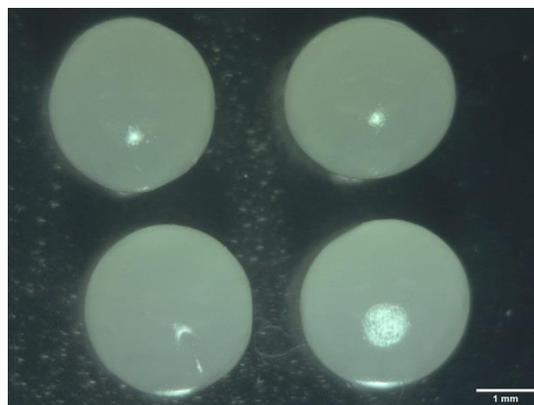


(f)

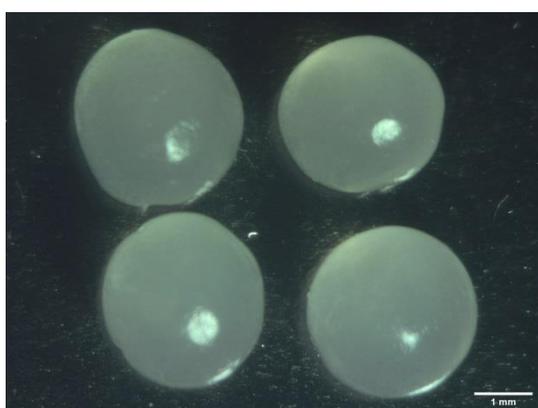
Figure S2. Microphotographs of calcium alginate-cornstarch hydrogel beads. Initial sucrose/GA solution with: (a) alginate at 1% (w/w) and cornstarch at 0.5% (w/w); (b) alginate at 1% (w/w) and cornstarch at 2% (w/w); (c) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (d) alginate at 2% (w/w) and cornstarch at 2% (w/w); (e) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (f) alginate at 2% (w/w) and cornstarch at 2% (w/w).



(a)



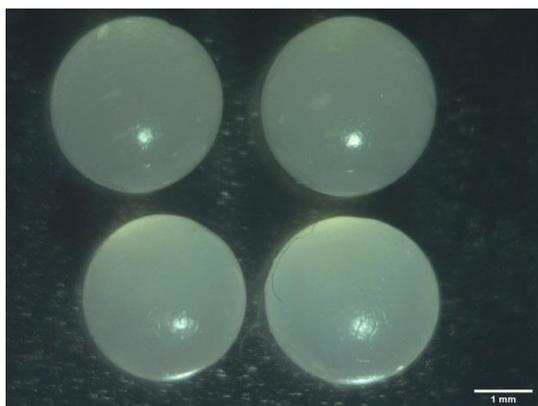
(b)



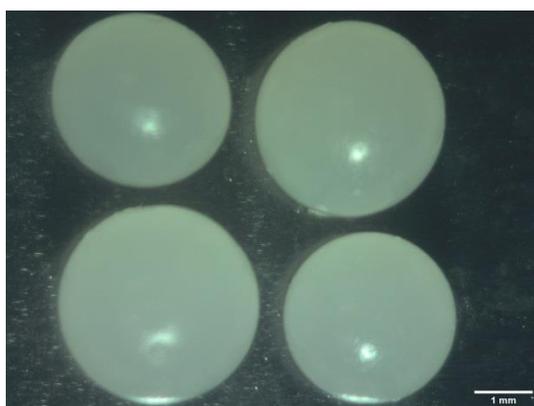
(c)



(d)



(e)



(f)

Figure S3. Microphotographs of calcium alginate-cornstarch hydrogel beads. Cryoconcentrated from cycle 1 with: (a) alginate at 1% (w/w) and cornstarch at 0.5% (w/w); (b) alginate at 1% (w/w) and cornstarch at 2% (w/w); (c) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (d) alginate at 2% (w/w) and cornstarch at 2% (w/w); (e) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (f) alginate at 2% (w/w) and cornstarch at 2% (w/w).

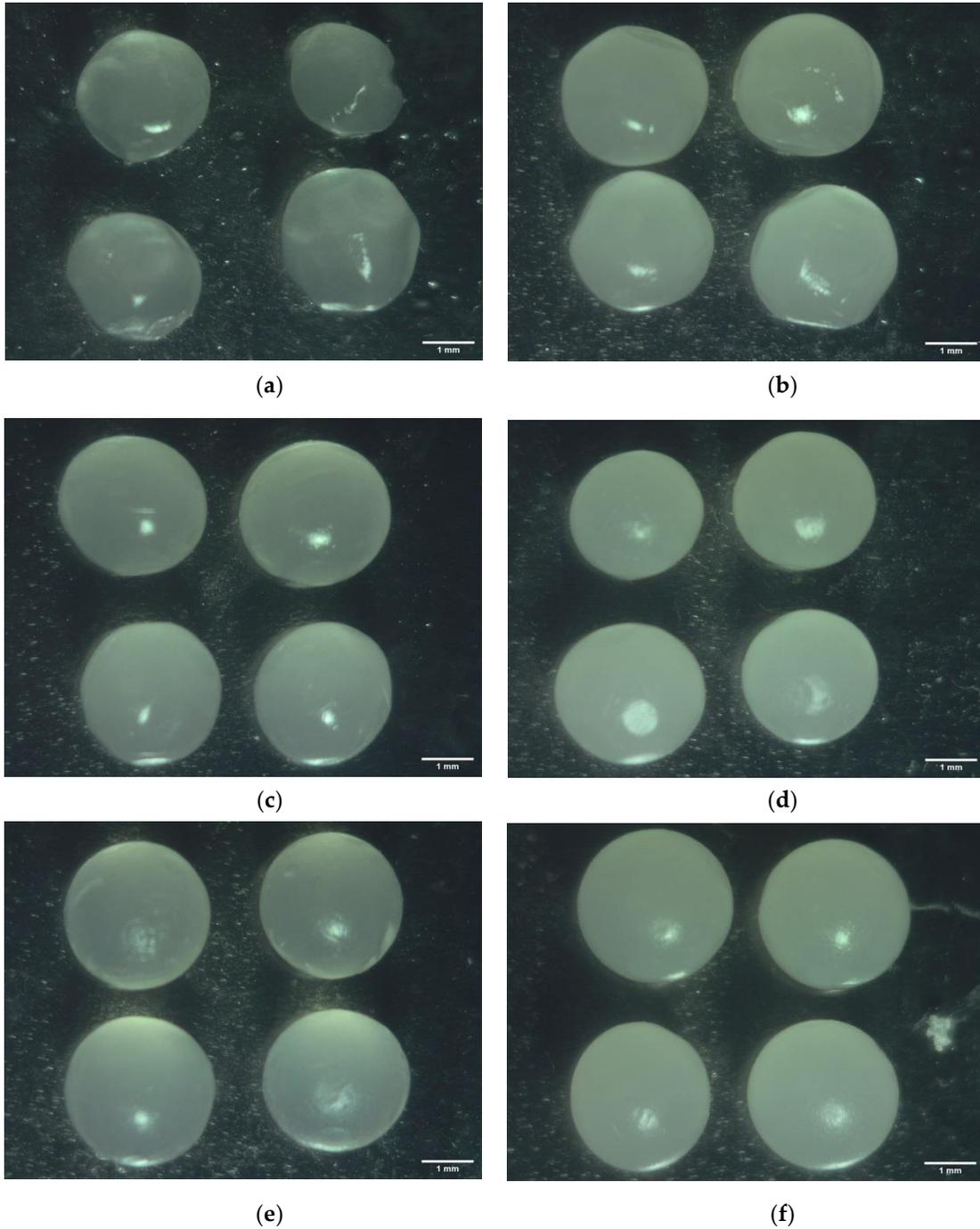


Figure S4. Microphotographs of calcium alginate-cornstarch hydrogel beads. Cryoconcentrated from cycle 2 with: (a) alginate at 1% (w/w) and cornstarch at 0.5% (w/w); (b) alginate at 1% (w/w) and cornstarch at 2% (w/w); (c) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (d) alginate at 2% (w/w) and cornstarch at 2% (w/w); (e) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (f) alginate at 2% (w/w) and cornstarch at 2% (w/w).

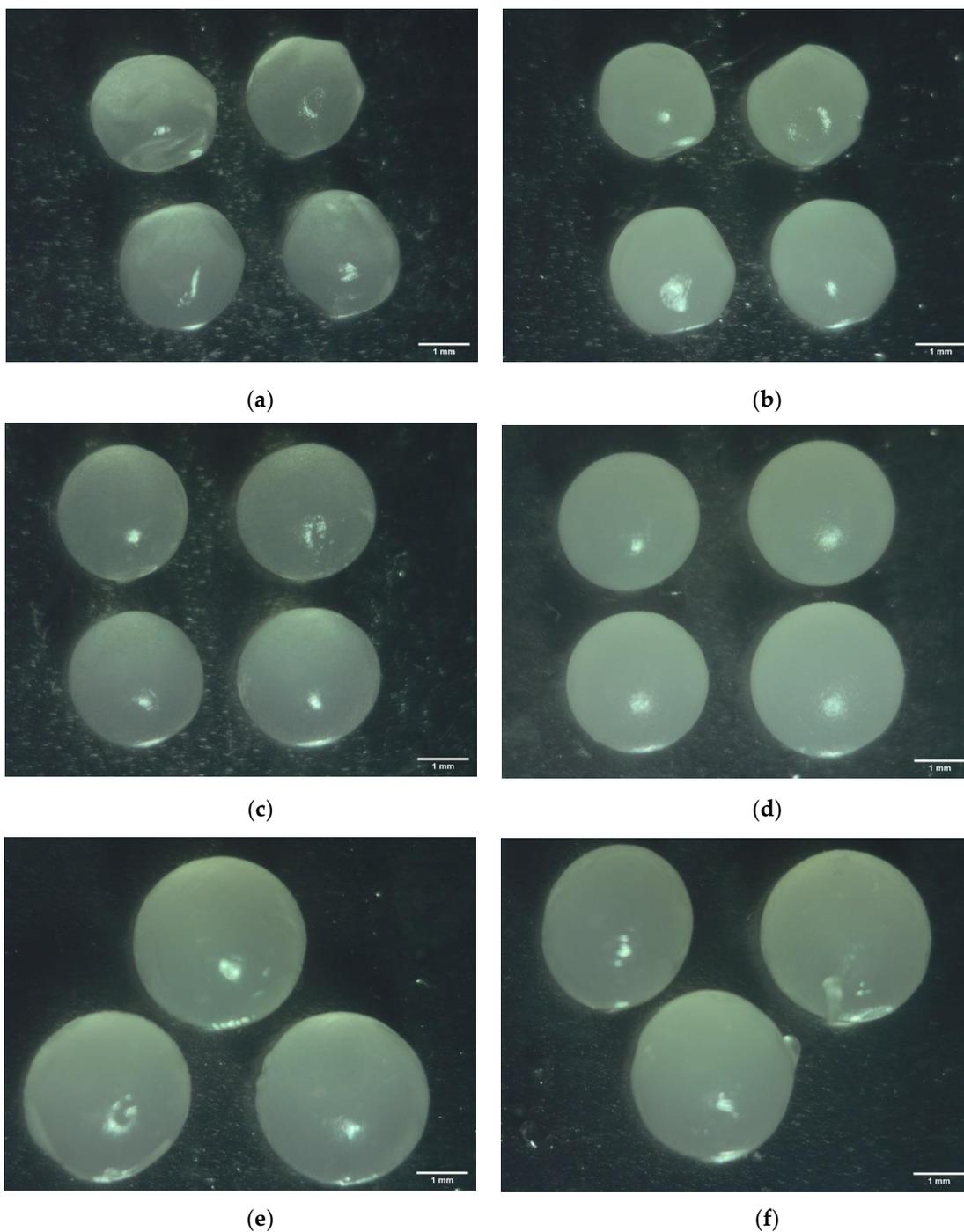


Figure S5. Microphotographs of calcium alginate-cornstarch hydrogel beads. Cryoconcentrated from cycle 3 with: (a) alginate at 1% (w/w) and cornstarch at 0.5% (w/w); (b) alginate at 1% (w/w) and cornstarch at 2% (w/w); (c) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (d) alginate at 2% (w/w) and cornstarch at 2% (w/w); (e) alginate at 2% (w/w) and cornstarch at 0.5% (w/w); (f) alginate at 2% (w/w) and cornstarch at 2% (w/w).

Table S1. Main results of calcium alginate (2% w/w)-cornstarch (2% w/w) hydrogel beads.

Sample	EE (%)	LC (%)	Particle size (mm)	SF	a _w	Moisture content (%)	ρ ^B (g/mL)
Initial solution	63.28 ± 1.54 ^a	86.03 ± 0.96 ^a	3.09 ± 0.02 ^a	0.02 ± 0.002 ^a	0.98 ± 0.01 ^a	86.1 ± 0.15 ^a	1.04 ± 0.05 ^a
Cycle 1	90.17 ± 3.15 ^c	81.12 ± 0.84 ^c	2.82 ± 0.02 ^b	0.02 ± 0.003 ^{ab}	0.97 ± 0.00 ^{ab}	81.5 ± 0.56 ^b	1.05 ± 0.05 ^{ab}
Cycle 2	97.73 ± 1.38 ^d	74.52 ± 1.02 ^d	2.73 ± 0.03 ^c	0.02 ± 0.004 ^{ab}	0.95 ± 0.01 ^c	80.0 ± 0.10 ^{bc}	1.11 ± 0.03 ^{bc}
Cycle 3	75.09 ± 3.01 ^b	68.25 ± 0.45 ^b	2.64 ± 0.02 ^d	0.02 ± 0.002 ^a	0.92 ± 0.01 ^d	73.6 ± 0.23 ^d	1.16 ± 0.11 ^{abcd}

Different small letters indicate significant differences at $p < 0.05$, respectively.