

**Green Engineering of Calcium Alginate Microcapsules Loaded with Vanillin-
Chitosan Complex for improving biosafety and bioavailability**

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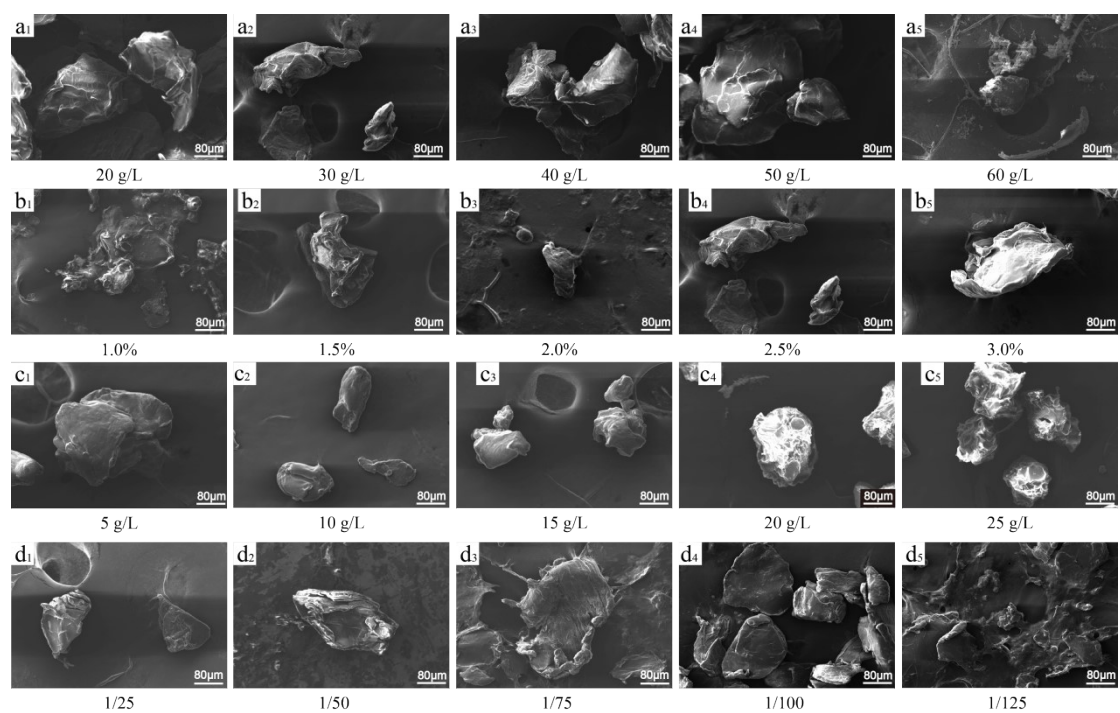


Fig. S1 SEM images of single factor experiment: (a) concentration of Ca²⁺, (b) Span 80 content of oil phase, (c) concentration of SA, (d) VCSB-Zn(II) to SA ratio.

Table S1 Fitting parameters of released curves

Kinetic model	Equation	Materials	Parameters		
			K_1	K_2	R^2
Zero-order	$y = K_1 t + K_2$	Zn(OAc) ₂	0.1105	71.6667	0.2141
		chitosan-Zn(II)	0.0820	37.7368	0.3345
		VCSB-Zn(II)	0.1502	44.4558	0.5163
		CA@VCSB-Zn(II)	0.2586	5.6183	0.8853
First-order	$y = K_2 [1 - e^{(-K_1 t)}]$	Zn(OAc) ₂	0.1401	95.2859	0.9950
		chitosan-Zn(II)	0.0592	55.5991	0.9830
		VCSB-Zn(II)	0.0294	79.3247	0.9823
		CA@VCSB-Zn(II)	0.0036	120.1938	0.9408
Higuchi	$y = K_1 t^{\frac{1}{2}}$	Zn(OAc) ₂	7.2161	-	-0.3155
		chitosan-Zn(II)	4.1555	-	0.1048
		VCSB-Zn(II)	5.6857	-	0.5631
		CA@VCSB-Zn(II)	4.2111	-	0.8478
Korsmeyer-Peppas	$y = K_2 t^{K_1}$	Zn(OAc) ₂	0.0305	81.9421	0.9997
		chitosan-Zn(II)	0.0999	27.8614	0.9842
		VCSB-Zn(II)	0.1951	1.0748	0.9735
		CA@VCSB-Zn(II)	0.7577	33.1935	0.9151