ACCSCIENCE PUBLISHING

International Journal of Bioprinting

RESEARCH ARTICLE

Achieving personalized nutrition for patients with diabetic complications via 3D food printing

Supplementary File

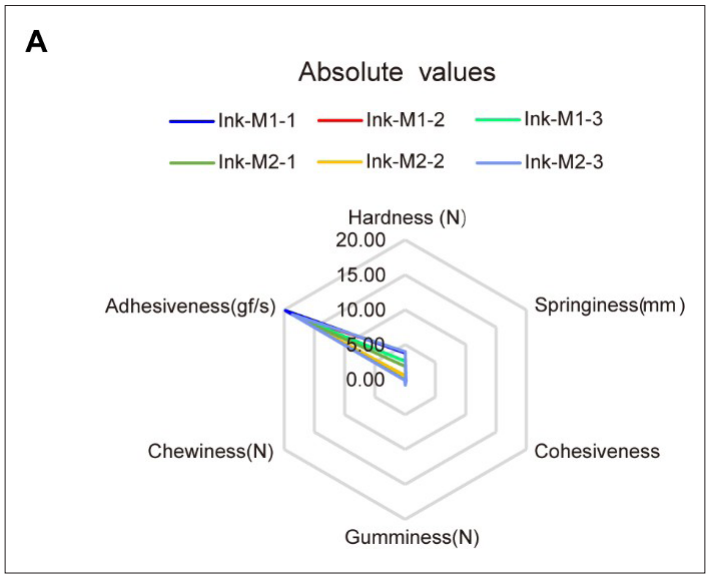


Figure S1. Radar map showing the absolute values of texture properties for each ink.

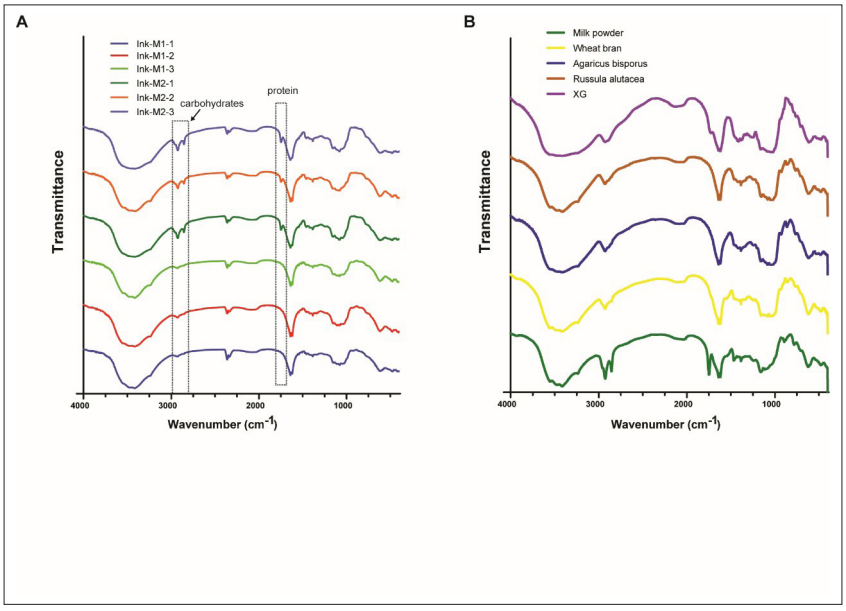


Figure S2. (A) FT-IR spectra of the six inks. (B) FT-IR spectra of the five ingredients used to formulate the food ink.

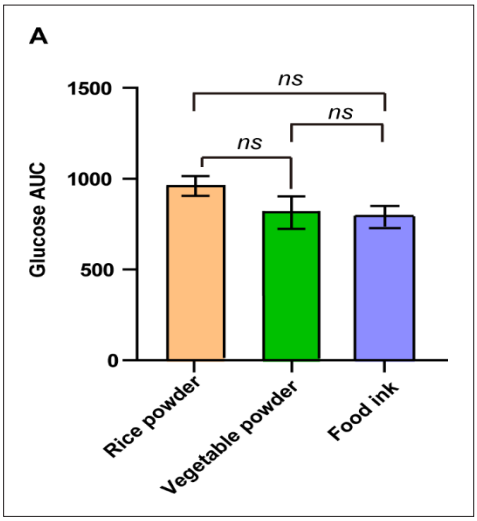


Figure S3. Glucose area under the curve (AUC) for equal-mass experiment.

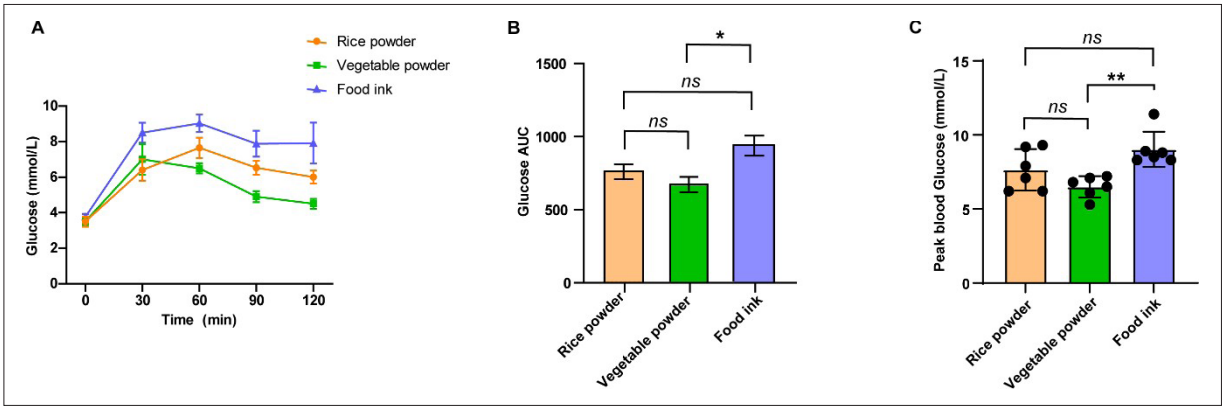


Figure S4. Glucose level of equal-carbohydrate experiment. (A) Blood glucose values of rice powder group, vegetable powder group, and food ink group at different time points. (B) Glucose area under the curve (AUC) of the three groups. (C) Peak blood glucose values of the three groups. *$p < 0.05$ and **$p < 0.01$ based on ANOVA.

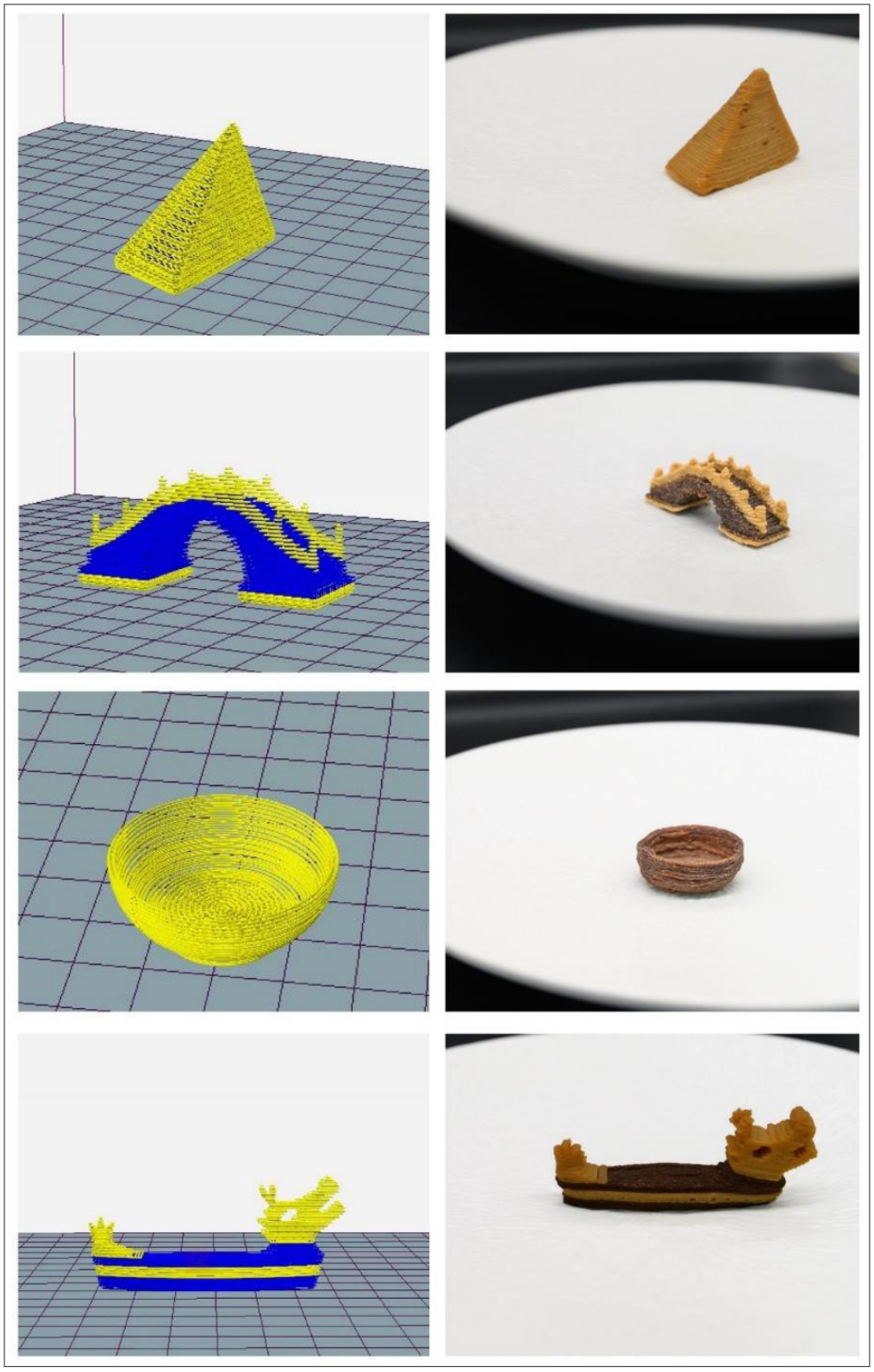


Figure S5. Design drawings and corresponding objects 3D-printed with dual nozzle.

Table S1. Composition of M1 food inks tested

Run	Material-1	Xanthan gum	Nozzle diameter (mm)	Fill density (%)	Printability
1	42.64	0.07	0.6	10	3.89
2	47.91	0.07	0.6	10	0.09
3	42.64	0.38	0.6	10	4.23
4	47.91	0.38	0.6	10	0.13
5	41.55	0.23	0.6	10	3.78
6	49.00	0.23	0.6	10	0
7	45.28	0.00	0.6	10	0.89
8	45.28	0.45	0.6	10	4.33
9	45.28	0.23	0.6	10	0.67
10	45.28	0.23	0.6	10	0.67
11	45.28	0.23	0.6	10	0.67
12	45.28	0.23	0.6	10	0.67
13	45.28	0.23	0.6	10	0.67
14	42.64	0.07	0.84	10	2.89
15	47.91	0.07	0.84	10	0.02
16	42.64	0.38	0.84	10	3.98
17	47.91	0.38	0.84	10	0.23
18	41.55	0.23	0.84	10	3.45
19	49.00	0.23	0.84	10	0
20	45.28	0.00	0.84	10	0.54
21	45.28	0.45	0.84	10	3.88
22	45.28	0.23	0.84	10	3.2
23	45.28	0.23	0.84	10	3.2
24	45.28	0.23	0.84	10	3.2
25	45.28	0.23	0.84	10	3.2
26	45.28	0.23	0.84	10	3.2
27	42.64	0.07	1.55	10	2.22
28	47.91	0.07	1.55	10	0.45
29	42.64	0.38	1.55	10	4.03
30	47.91	0.38	1.55	10	4.12
31	41.55	0.23	1.55	10	3.64
32	49.00	0.23	1.55	10	0
33	45.28	0.00	1.55	10	2.73
34	45.28	0.45	1.55	10	4.23
35	45.28	0.23	1.55	10	4.19
36	45.28	0.23	1.55	10	4.19
37	45.28	0.23	1.55	10	4.19
38	45.28	0.23	1.55	10	4.19

Continued....

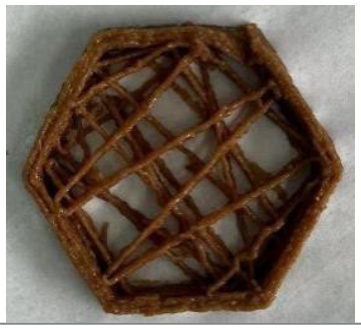
Table S1. *Continued...*

Run	Material-1	Xanthan gum	Nozzle diameter (mm)	Fill density (%)	Printability
39	45.28	0.23	1.55	10	4.19
40	42.64	0.07	0.6	40	2.23
41	47.91	0.07	0.6	40	0.66
42	42.64	0.38	0.6	40	3.87
43	47.91	0.38	0.6	40	0.76
44	41.55	0.23	0.6	40	2.56
45	49.00	0.23	0.6	40	0
46	45.28	0.00	0.6	40	1.65
47	45.28	0.45	0.6	40	3.67
48	45.28	0.23	0.6	40	2.03
49	45.28	0.23	0.6	40	2.03
50	45.28	0.23	0.6	40	2.03
51	45.28	0.23	0.6	40	2.03
52	45.28	0.23	0.6	40	2.03
53	42.64	0.07	0.84	40	2.88
54	47.91	0.07	0.84	40	0.67
55	42.64	0.38	0.84	40	4.21
56	47.91	0.38	0.84	40	0.68
57	41.55	0.23	0.84	40	3.88
58	49.00	0.23	0.84	40	0
59	45.28	0.00	0.84	40	2.08
60	45.28	0.45	0.84	40	4.23
61	45.28	0.23	0.84	40	4.07
62	45.28	0.23	0.84	40	4.07
63	45.28	0.23	0.84	40	4.07
64	45.28	0.23	0.84	40	4.07
65	45.28	0.23	0.84	40	4.07
66	42.64	0.07	1.55	40	0.98
67	47.91	0.07	1.55	40	2.78
68	42.64	0.38	1.55	40	3.78
69	47.91	0.38	1.55	40	3.34
70	41.55	0.23	1.55	40	3.48
71	49.00	0.23	1.55	40	0.13
72	45.28	0.00	1.55	40	2.89
73	45.28	0.45	1.55	40	4.17
74	45.28	0.23	1.55	40	4.17
75	45.28	0.23	1.55	40	4.17
76	45.28	0.23	1.55	40	4.17

Continued....

Table S1. *Continued...*

Run	Material-1	Xanthan gum	Nozzle diameter (mm)	Fill density (%)	Printability
77	45.28	0.23	1.55	40	4.17
78	45.28	0.23	1.55	40	4.17
79	42.64	0.07	0.6	80	2.87
80	47.91	0.07	0.6	80	0.56
81	42.64	0.38	0.6	80	3.89
82	47.91	0.38	0.6	80	1.78
83	41.55	0.23	0.6	80	3.55
84	49.00	0.23	0.6	80	0
85	45.28	0.00	0.6	80	1.03
86	45.28	0.45	0.6	80	3.67
87	45.28	0.23	0.6	80	2.65
88	45.28	0.23	0.6	80	2.65
89	45.28	0.23	0.6	80	2.65
90	45.28	0.23	0.6	80	2.65
91	45.28	0.23	0.6	80	2.65
92	42.64	0.07	0.84	80	3.03
93	47.91	0.07	0.84	80	1.55
94	42.64	0.38	0.84	80	4.12
95	47.91	0.38	0.84	80	1.65
96	41.55	0.23	0.84	80	4.01
97	49.00	0.23	0.84	80	0
98	45.28	0.00	0.84	80	2.83
99	45.28	0.45	0.84	80	4.53
100	45.28	0.23	0.84	80	3.64
101	45.28	0.23	0.84	80	3.64
102	45.28	0.23	0.84	80	3.64
103	45.28	0.23	0.84	80	3.64
104	45.28	0.23	0.84	80	3.64
105	42.64	0.07	1.55	80	3.12
106	47.91	0.07	1.55	80	0.52
107	42.64	0.38	1.55	80	4.08
108	47.91	0.38	1.55	80	3.67
109	41.55	0.23	1.55	80	3.88
110	49.00	0.23	1.55	80	0.12
111	45.28	0.00	1.55	80	3.23
112	45.28	0.45	1.55	80	4.44
113	45.28	0.23	1.55	80	4.07
114	45.28	0.23	1.55	80	4.07
115	45.28	0.23	1.55	80	4.07
116	45.28	0.23	1.55	80	4.07
117	45.28	0.23	1.55	80	4.07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	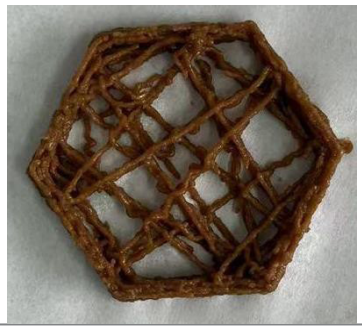	Unable to extrude
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	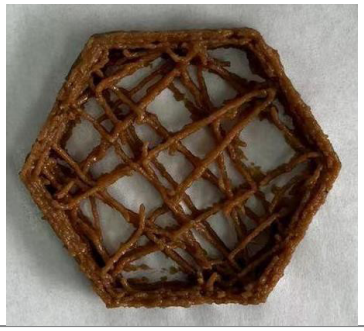	
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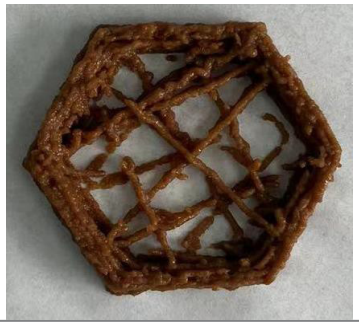		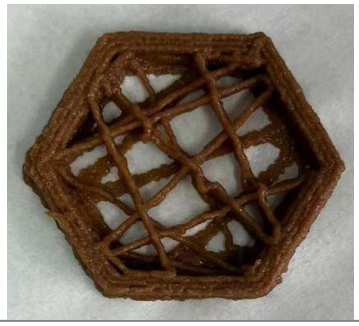
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	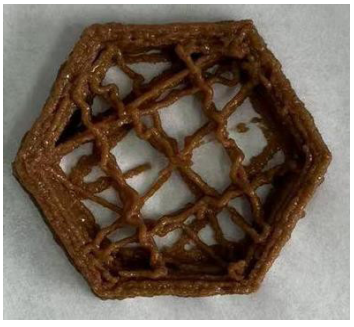	Unable to extrude
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	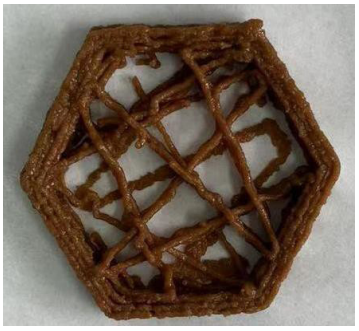	
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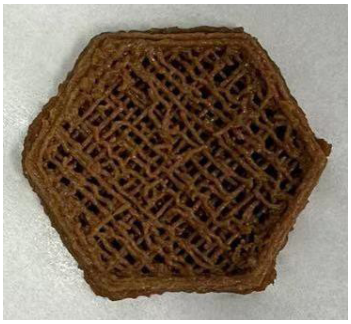		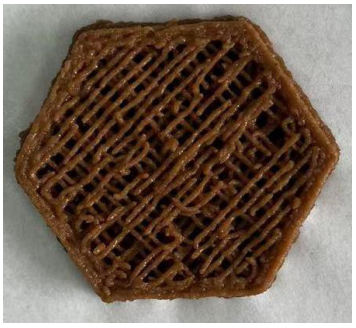
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	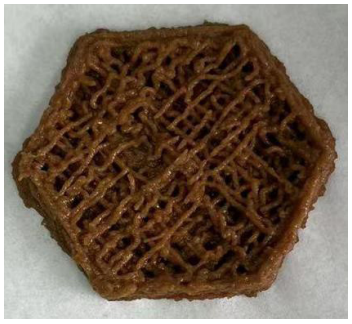	Unable to extrude
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	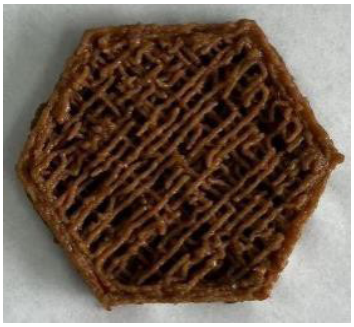	
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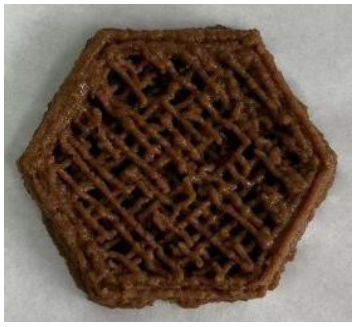		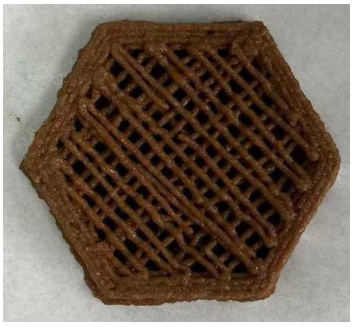
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	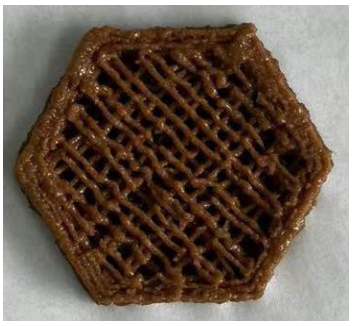	Unable to extrude
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	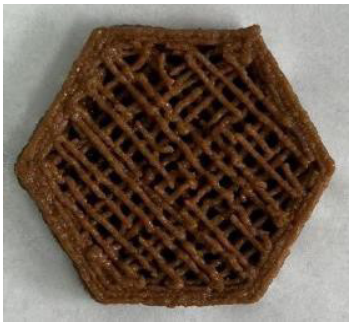	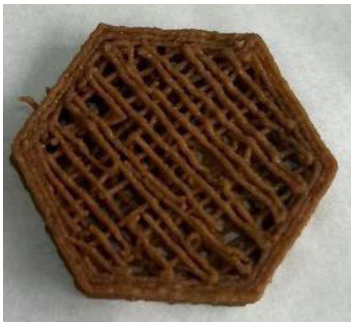
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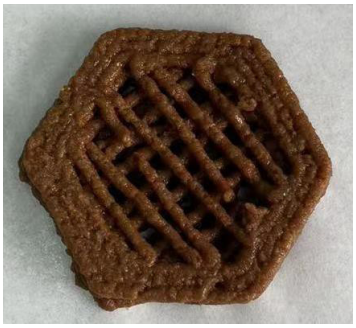		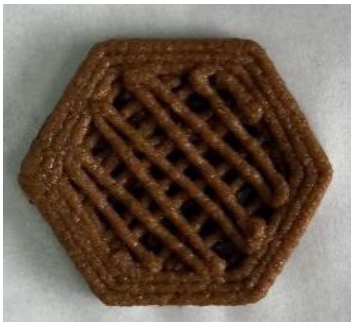
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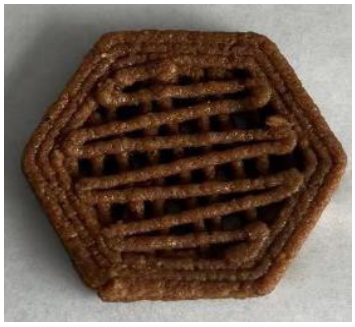	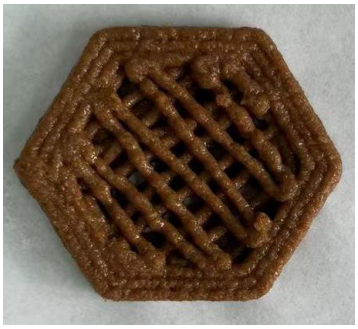	
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	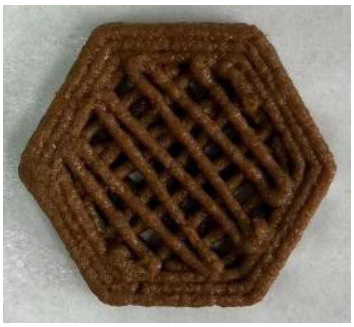	
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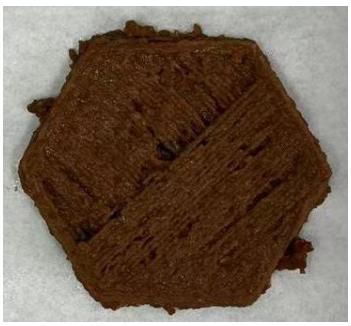	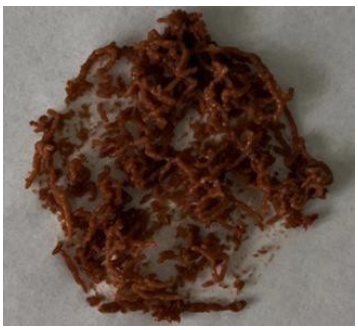	
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	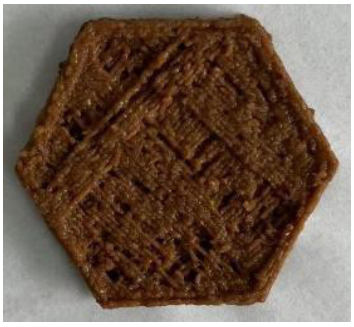	
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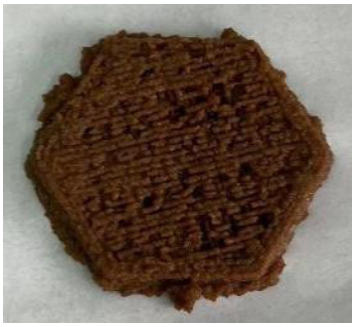		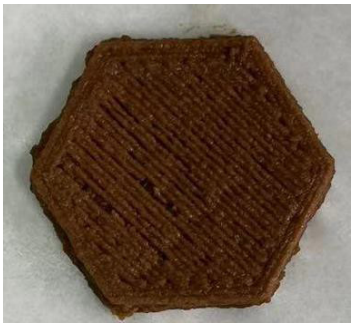
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	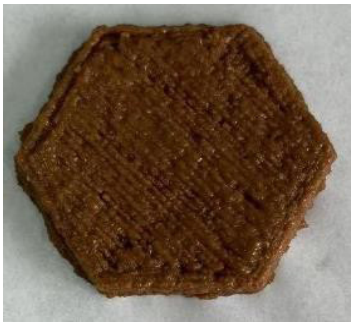	Unable to extrude
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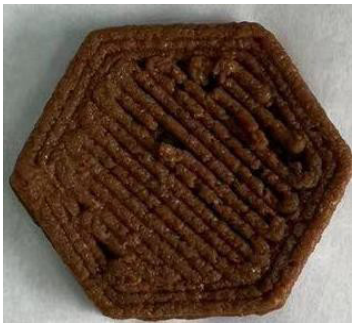

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Table S2. Composition of M2 food inks tested

Code	Material-2 (%)	Water (%)	Fill density (%)	Nozzle diameter(mm)	Printability
1	45	55	10%	0.6	1.19
2	50	50	10%	0.6	3.95
3	55	45	10%	0.6	4.17
4	60	40	10%	0.6	3.13
5	65	35	10%	0.6	0.00
6	45	55	40%	0.6	2.19
7	50	50	40%	0.6	3.40
8	55	45	40%	0.6	4.33
9	60	40	40%	0.6	4.04
10	65	35	40%	0.6	0.00
11	45	55	80%	0.6	3.59
12	50	50	80%	0.6	3.84
13	55	45	80%	0.6	4.36
14	60	40	80%	0.6	4.11
15	65	35	80%	0.6	0.00
16	45	55	10%	0.84	3.00
17	50	50	10%	0.84	3.73
18	55	45	10%	0.84	3.85
19	60	40	10%	0.84	3.96
20	65	35	10%	0.84	0.00
21	45	55	40%	0.84	3.03
22	50	50	40%	0.84	3.73
23	55	45	40%	0.84	4.24
24	60	40	40%	0.84	4.23
25	65	35	40%	0.84	0.00
26	45	55	80%	0.84	3.97
27	50	50	80%	0.84	4.21
28	55	45	80%	0.84	4.46
29	60	40	80%	0.84	3.09
30	65	35	80%	0.84	0.00
31	45	55	10%	1.55	2.88
32	50	50	10%	1.55	3.02
33	55	45	10%	1.55	3.31
34	60	40	10%	1.55	3.60
35	65	35	10%	1.55	0.00
36	45	55	40%	1.55	3.40
37	50	50	40%	1.55	3.54

Continued....

Table S2. *Continued...*

Code	Material-2 (%)	Water (%)	Fill density (%)	Nozzle diameter(mm)	Printability
38	55	45	40%	1.55	3.78
39	60	40	40%	1.55	3.82
40	65	35	40%	1.55	0.00
41	45	55	80%	1.55	3.40
42	50	50	80%	1.55	3.08
43	55	45	80%	1.55	4.05
44	60	40	80%	1.55	3.91
45	65	35	80%	1.55	0.00

1

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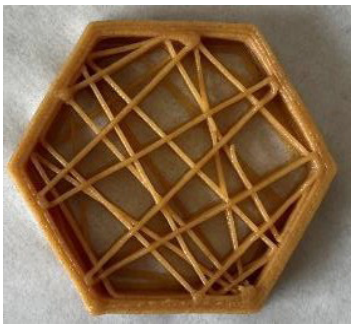

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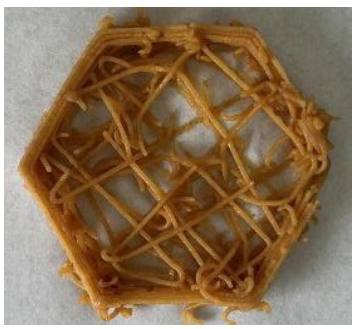

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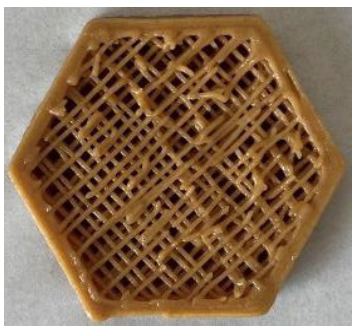

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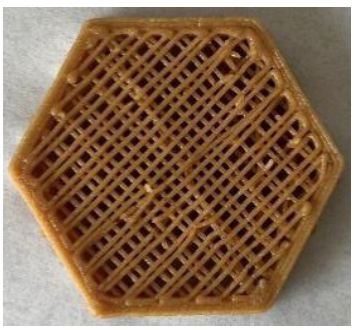

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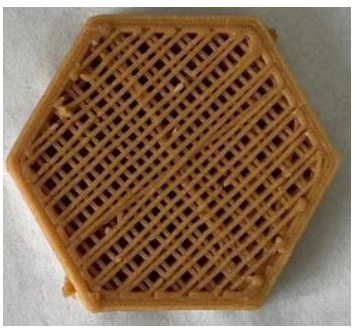

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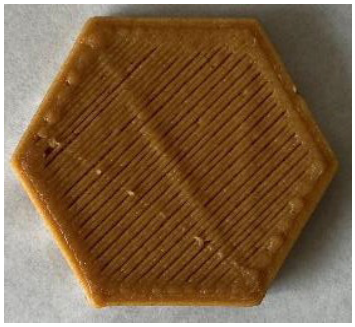	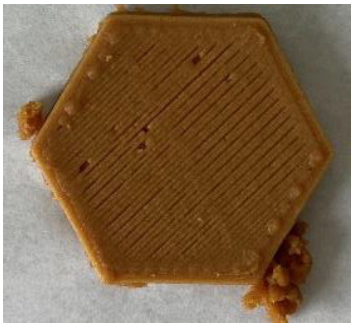	Unable to extrude
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	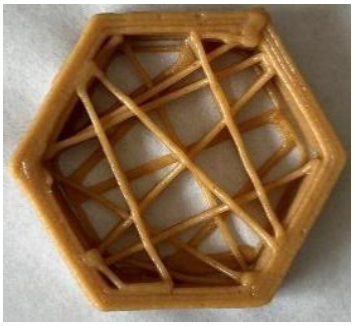	
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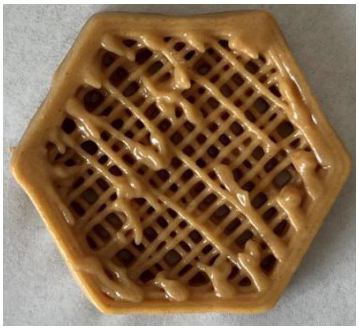
	Unable to extrude	
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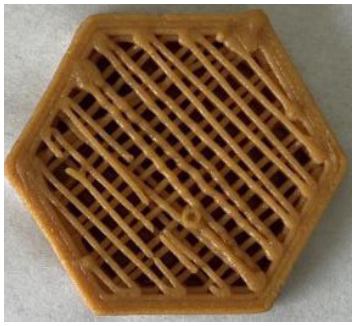	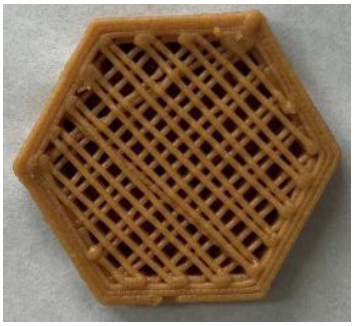	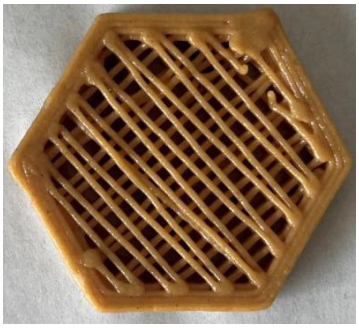
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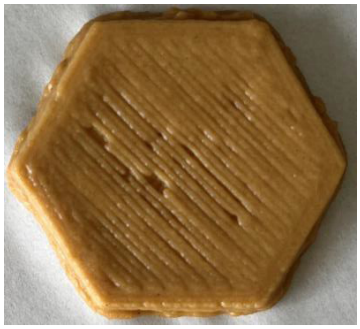
Unable to extrude		
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	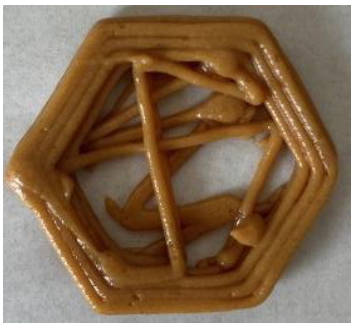	
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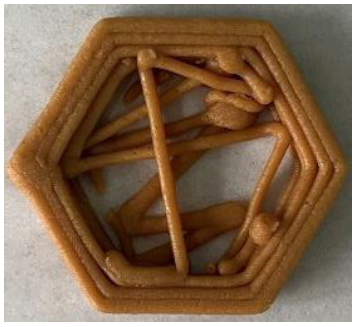
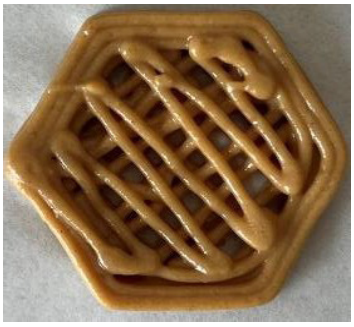
	Unable to extrude	
34	35	36
		
37	37	39
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40	41	42
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43	44	45

Table S3. Nutritional content of rice powder vegetable and food ink

	Carbohydrate (g)	Protein (g)	Fat (g)	Energy (kJ)
Rice powder	73.50	7.30	0.80	1403.00
Vegetable	63.00	6.40	0.60	1202.00
Food ink	46.88	26.48	9.53	1599.00

Table S4. Macronutrient and calorie content of dragon boats 3D-printed with various proportions of Ink-M1-1

	Carbohydrate (g)	Protein (g)	Fat (g)	Energy (kJ)
Ink-M1-1-100	2.12–2.36	0.79–0.87	0.13–0.14	54.11–60.05
Ink-M1-1-90.2	2.08–2.30	0.85–0.94	0.18–0.20	56.53–62.74
Ink-M1-1-75.2	2.01–2.23	0.95–1.05	0.27–0.30	60.21–66.82
Ink-M1-1-49.0	1.89–2.09	1.12–1.24	0.42–0.47	66.67–79.99
Ink-M1-1-30.6	1.80–2.00	1.24–1.37	0.53–0.59	71.20–79.02
Ink-M1-1-9.8	1.71–1.89	1.37–1.52	0.65–0.72	76.33–84.70
Ink-M1-1-0	1.66–1.84	1.44–1.59	0.71–0.78	78.74–87.39