Supporting Information for

Preparation of acid-driven magnetic imprinted micromotors and selective loading of phycocyanin

Guangdong Yang[‡a], Jiajing Liu[‡c], Zhong Zhang[a,b *], Li Yuan[a], Hongye Tian[a], Xingbin Yang[a]

[a] *Shaanxi Engineering Laboratory for Food Green Processing and Safety Control, Engineering Research Center of High Value Utilization of Western Fruit Resources, Ministry of Education, College of Food Engineering and Nutritional Science, Shaanxi Normal University, Xi'an, Shaanxi, 710119, P.R. China;*

[b] *Xi'an Key Laboratory of Characteristic Fruit Storage and Preservation, Shaanxi Key Laboratory for Hazard Factors Assessment in Processing and Storage of Agricultural Products, Shaanxi Normal University, Xi'an, Shaanxi, 710119, P.R. China;*

[c] *School of Food Science and Engineering, South China University of Technology, Guangzhou, Guangdong, 510641 P.R. China.*

* Corresponding authors.

E-mail: zzhang@snnu.edu.cn; Fax: +86 10-85310517; Tel: +86 10-85310517.

‡ Contributed equally to this work.

Supporting Information Contents

1. Preparation of the electrodeposited solution

A cyclopore polycarbonate membrane, containing 2 μm diameter conical-shaped orderedmicropores (Catalog No 7060-2511; Whatman, Maidstone, U.K.), was employed as the template. PEDOT / PSS blot layer solution was prepared by mixing a mixture of 20 mmol/L EDOT and 250 mmol/L PSS. Platinum plating solution was prepared by mixing a mixture of 33 mmol/L H_2PtCl_6, 33 μmol/L $Pb(NO_3)_2$ and 0.5 mol/L HCl. Nickel plating solution was prepared by mixing a mixture of 84 mmol/L $NiCl_2 \cdot 6H_2O$, 1.6 mol/L $Ni(H_2NSO_3)_2 \cdot 4H_2O$, and 322 mmol/L H_3BO_3.Subsequently, a zinc layer was deposited galvanostatically within the PANI layer using an 80 g L^{-1} $ZnSO_4$/20 g L^{-1} H_3BO_3 solution (buffered to pH 2.5 with sulfuric acid).

2. Video captions

Video S1 Preliminary determination of magnetic properties of micromotors by magnetic rods.

Video S2 Magnetic guided steering of micromotors in the solution.

Video S3 Self-driven motion of micromotors in acidic fluids.

3. Figure captions

Fig. S1 Assembly of electrolytic cell and four step process of template electrochemical deposition.

Fig. S2 Electroplating solution.

Fig. S3 Microscopic images of magnetically imprinted micromotors: (A, C) Micromotors under 10×; (B) micromotors under 40×.

Fig. S4 EDA image of a micromotor.

Fig. S5 Influence of different concentrations of Triton X-100 on the effect of micromotor bubbles when pH = 1: (A) 0%; (B) 1%; (C) 2%; (D) 3% Triton X-100.

Fig. S6 Laser confocal image of the micromotor: (A, B) After three dissolution and centrifugation treatments, (C) After incubation with 0.5 mg/mL phycocyanin

solution for 20 min.

Fig. S7 CCK-8 toxicity test of micromotor on the cell survival rate of human liver cells at different concentrations.

4. Table captions

Table S1 Parameters of electrochemical deposition.

Fig. S1

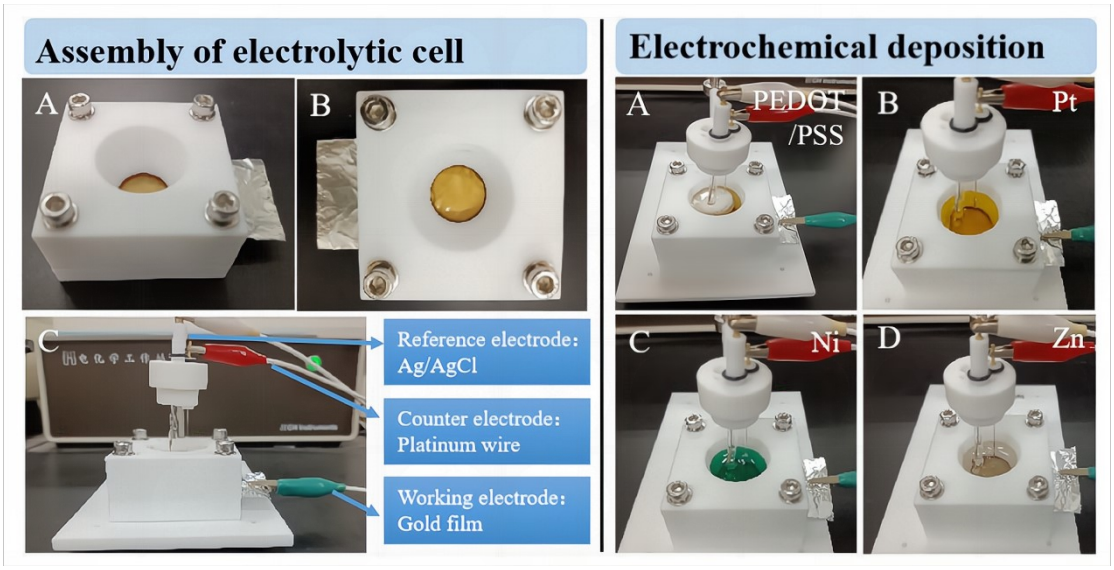
Assembly of electrolytic cell
A
B
C
Reference electrode: Ag/AgCl
Counter electrode: Platinum wire
Working electrode: Gold film
Electrochemical deposition
A
PEDOT /PSS
B
Pt
C
Ni
D
Zn

Fig. S2

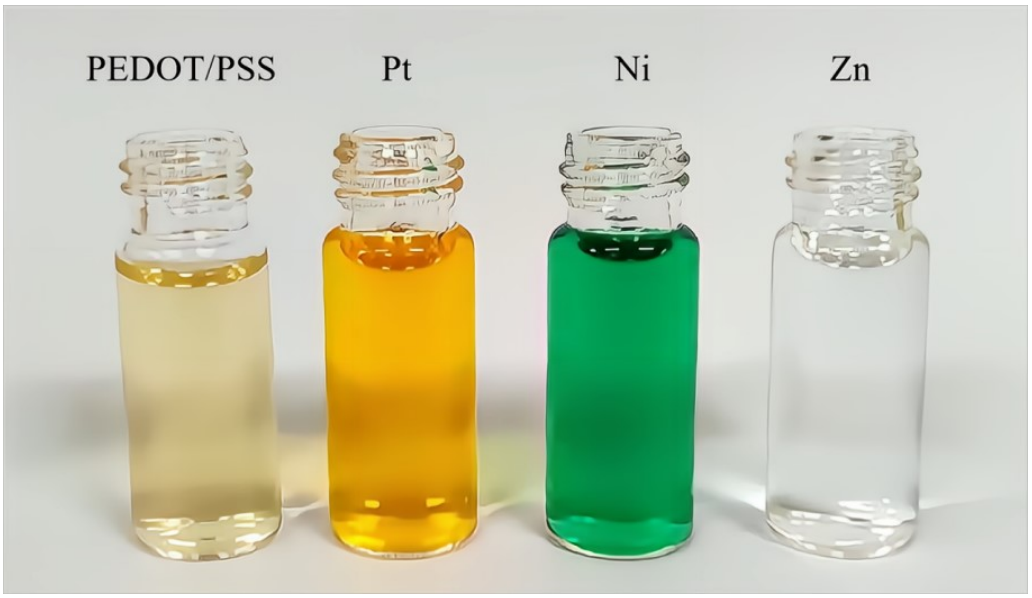
PEDOT/PSS
Pt
Ni
Zn

Fig. S3

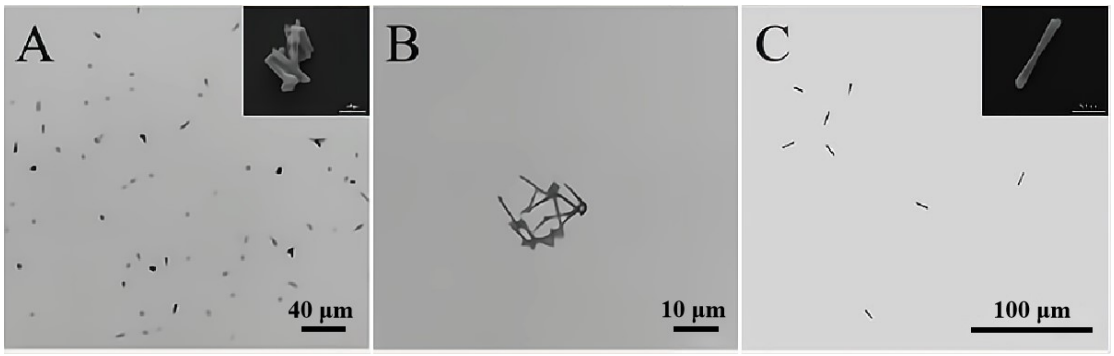
A
40 µm
B
10 µm
C
100 µm

Fig. S4

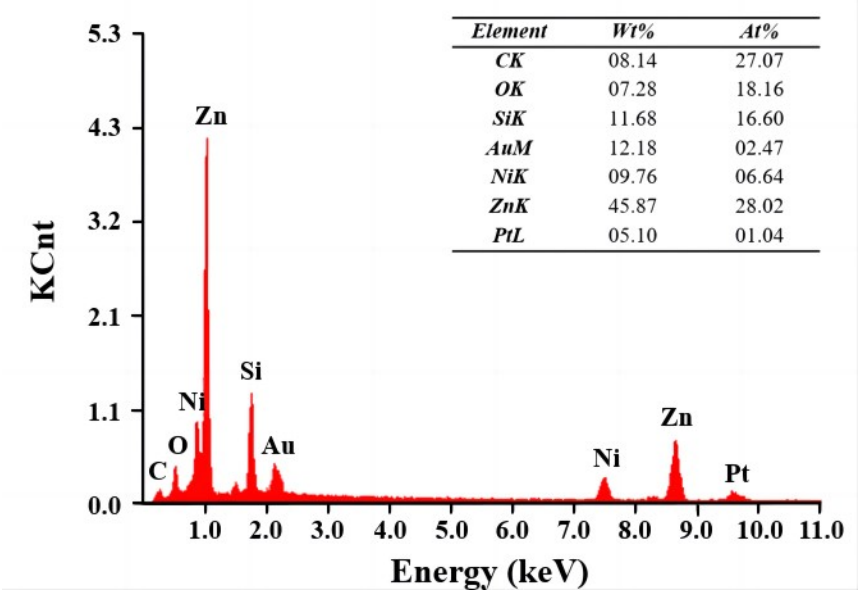
Element Wt% At%
CK 08.14 27.07
OK 07.28 18.16
SiK 11.68 16.60
AuM 12.18 02.47
NiK 09.76 06.64
ZnK 45.87 28.02
PtL 05.10 01.04
KCnt
5.3
4.3
3.2
2.1
1.1
0.0
Zn
Ni
Si
O
Au
C
Zn
Ni
Pt
1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0
Energy (keV)

Fig. S5

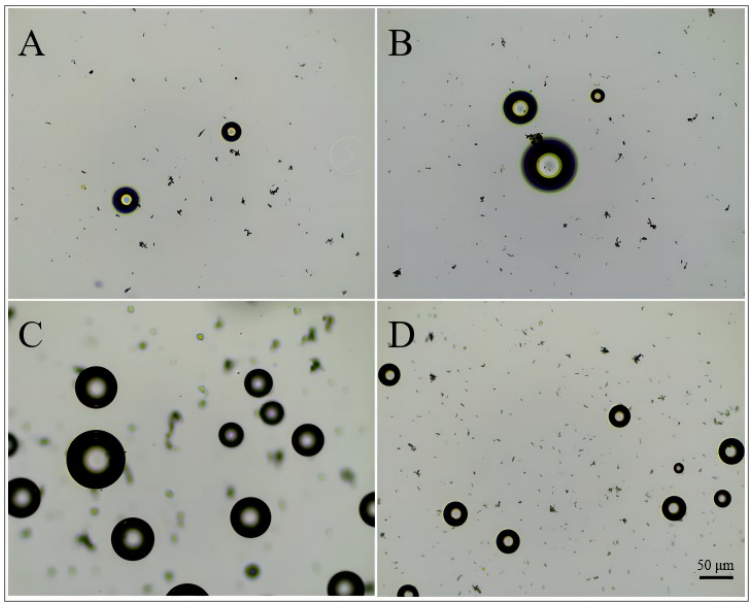

Fig. S6

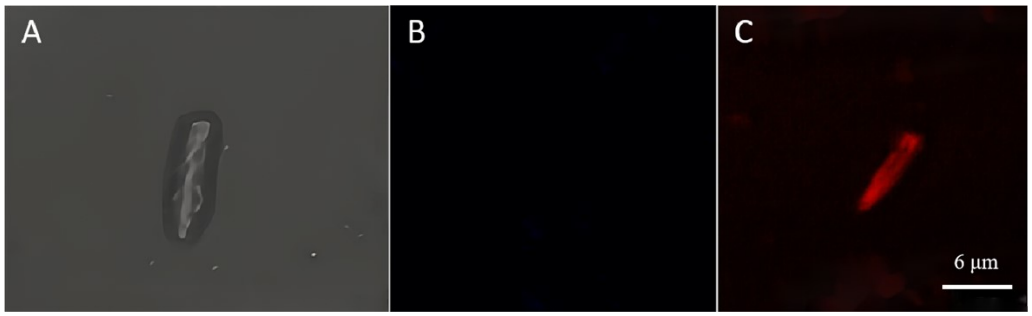
A
B
C
6 μm

Fig. S7

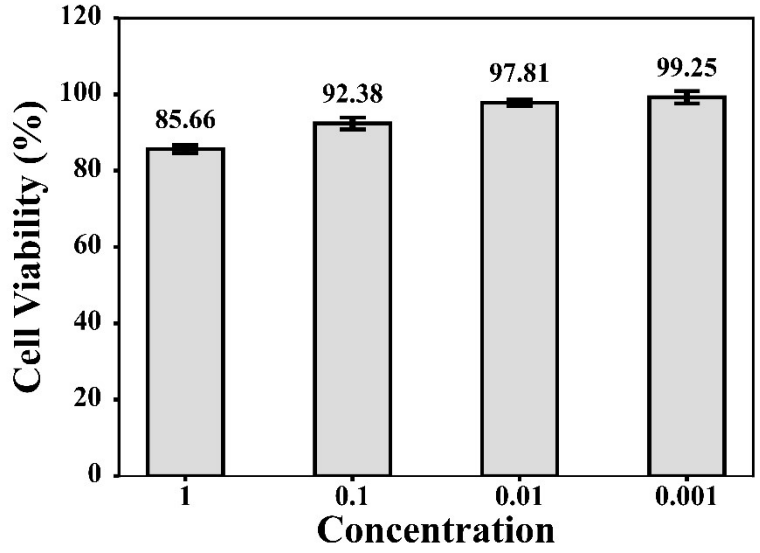
120
100
80
60
40
20
0
Cell Viability (%)
85.66
92.38
97.81
99.25
1
0.1
0.01
0.001
Concentration

Table S1

Electrosedimentary layer	Method	Parameter
PEDOT/PSS	Constant voltage method	+0.8 V, 4 C
Pt	Constant current method	-2 mA, 400 s
Ni	Constant voltage method	-1.3 V, 3 C
Zn	Constant voltage method	-1.3 V, 10 C