Supplementary Information

Urine-powered synergy of nutrient recovery and urine purification in a microbial electrochemical system

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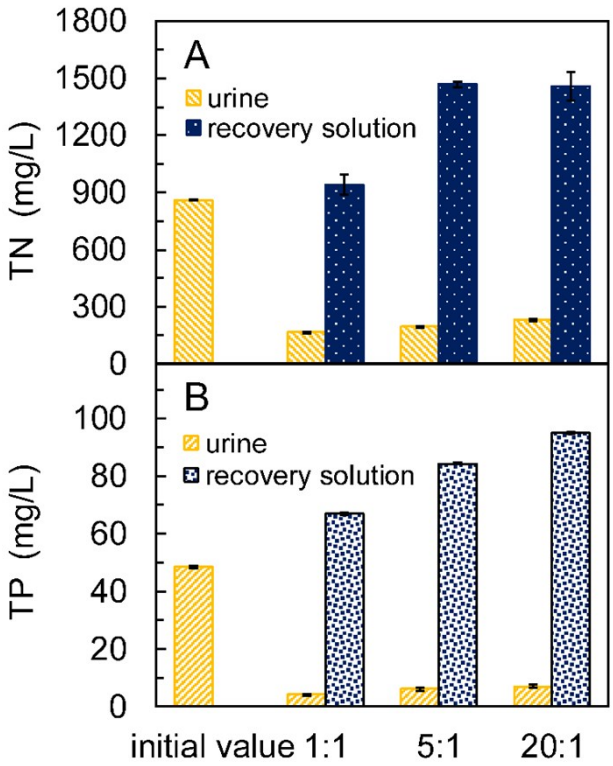

Figure S1. Concentrations of TN (A) and TP (B) in the urine and recovery solution with different volume ratios of urine/recovery solution; initial value means initial values of TN and TP in urine and recovery solution at beginning of each cycle.

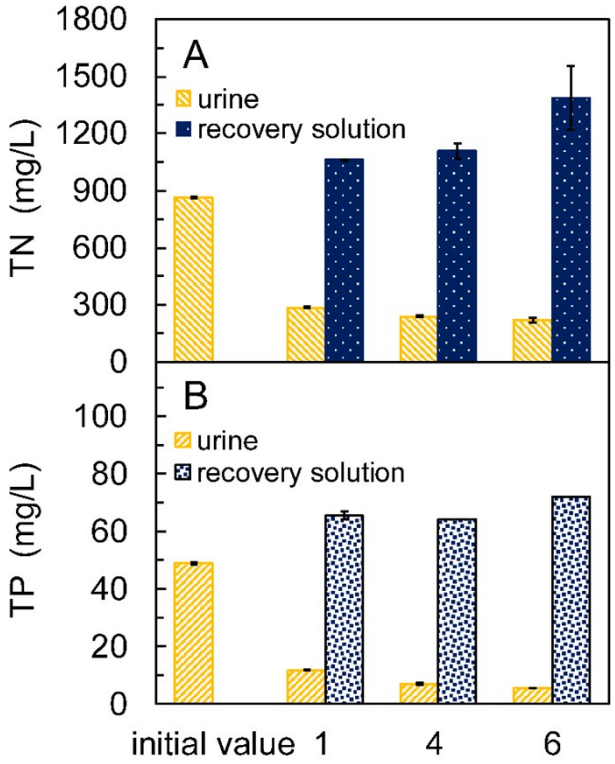

Figure S2. Concentrations of TN (A) and TP (B) in the urine and recovery solution with different flow rates (mL/min); initial value means initial values of TN and TP in urine and recovery solution at beginning of each cycle.

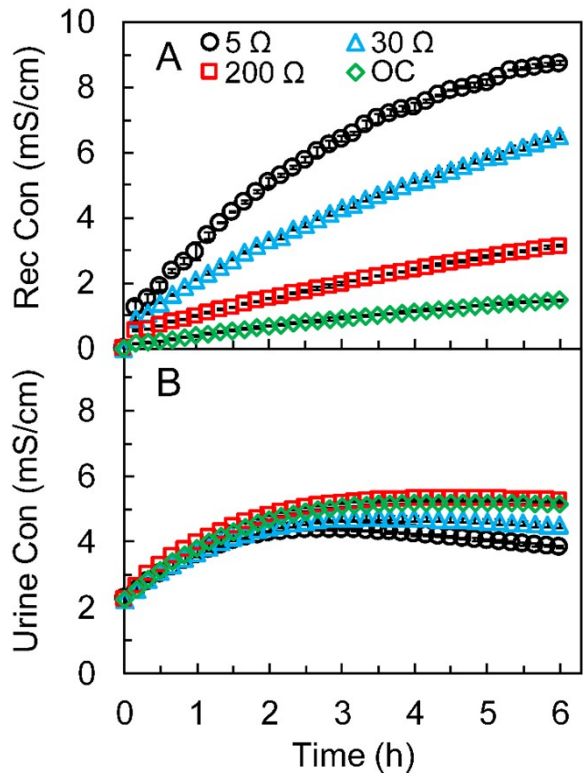

Figure S3. Conductivity changes of recovery solution (A) and urine (B) with different external resistances; (OC: open circuit; Rec: recovery solution; Con: conductivity).

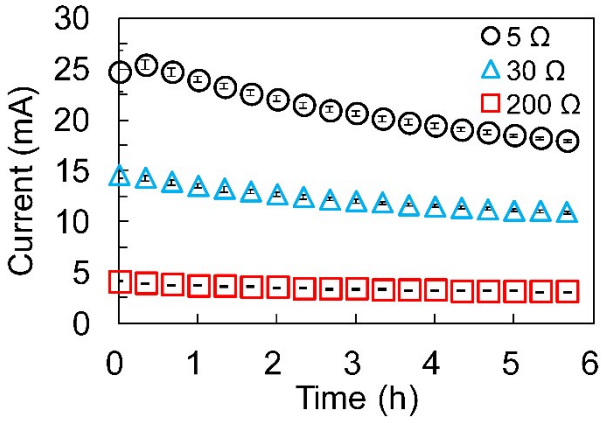

Figure S4. Current of U-Power with different external resistances.

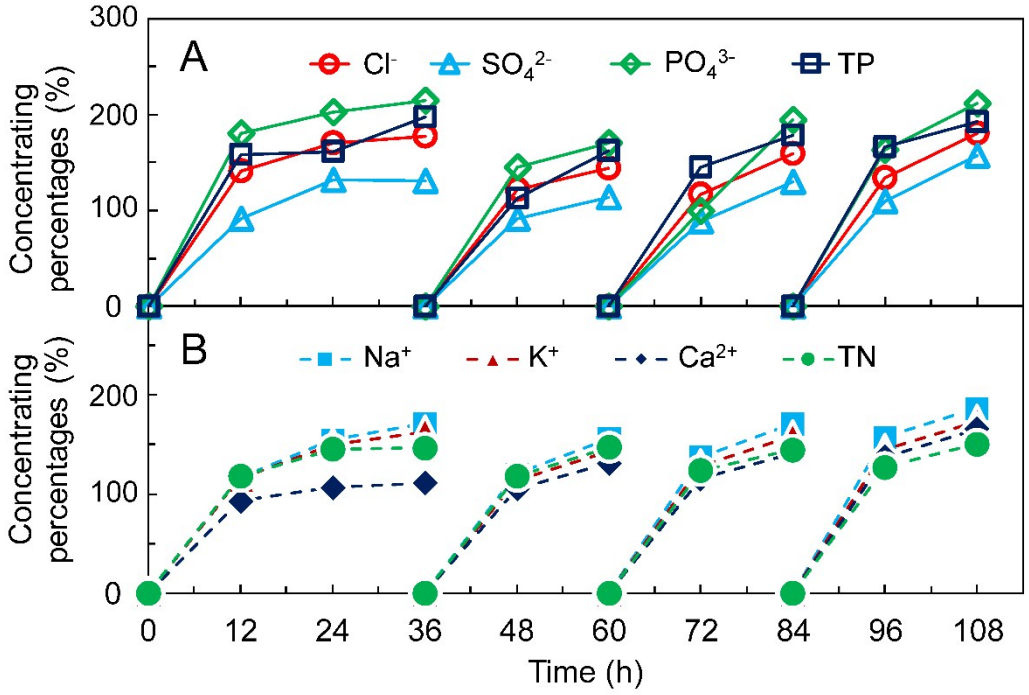

Figure S5. Concentrating percentages of each type of ion in the recovery solution; A: anion; B: cation.

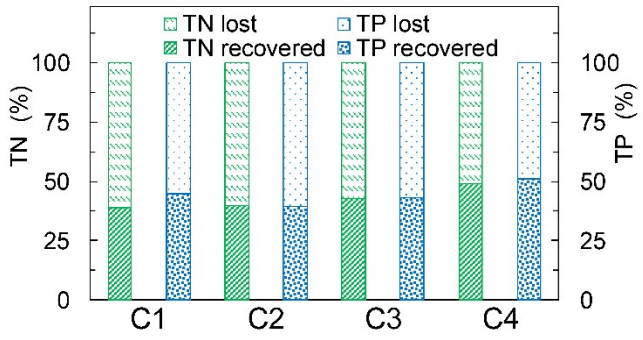

Figure S6. The recovery efficiencies of TN and TP. C1 to C4 stand for cycle 1 to cycle 4.

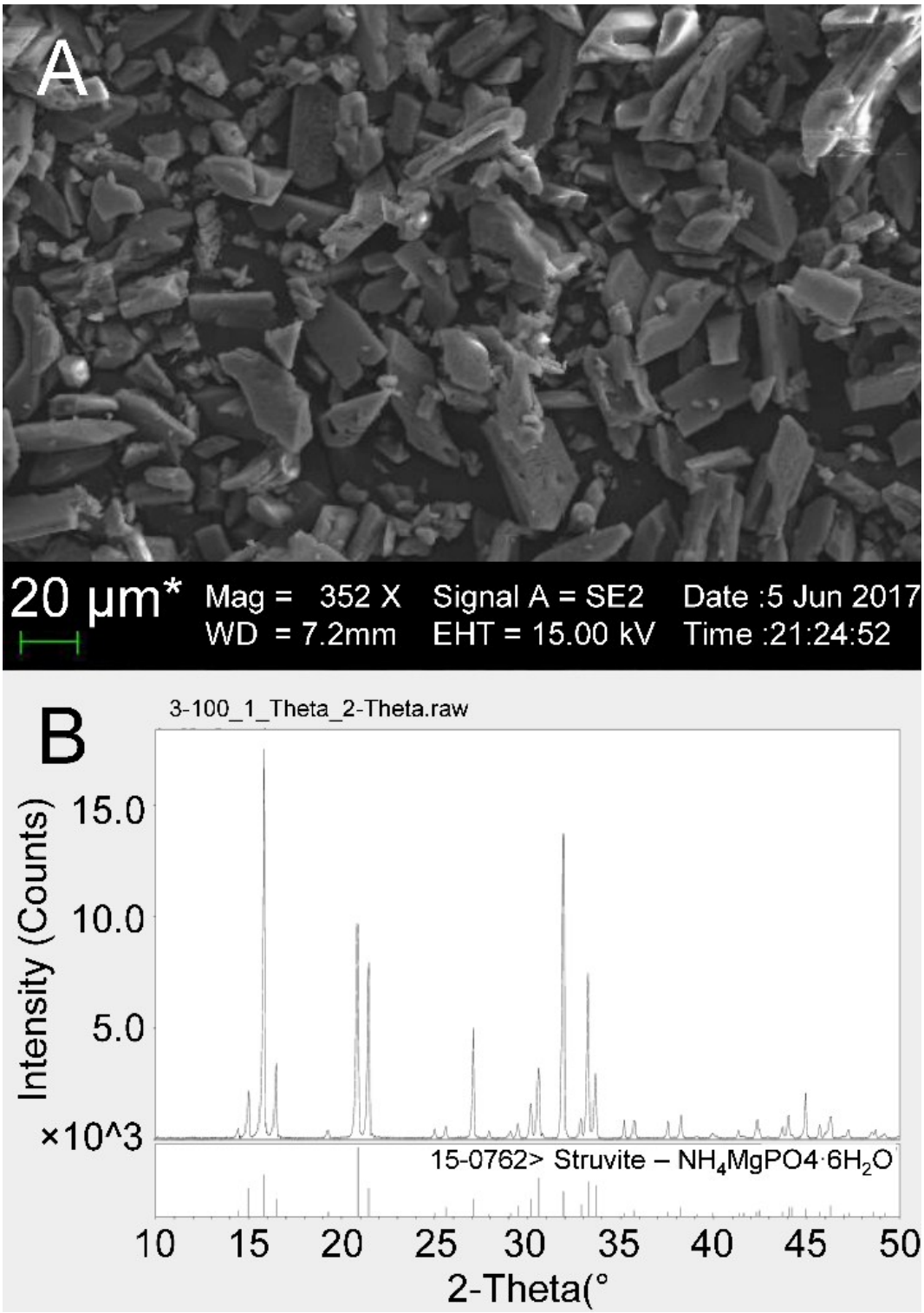

Figure S7. A microscopic SEM photo (A) of struvite. XRD analysis (B) of the struvite precipitate (under line: standard struvite, above line: precipitate sample).

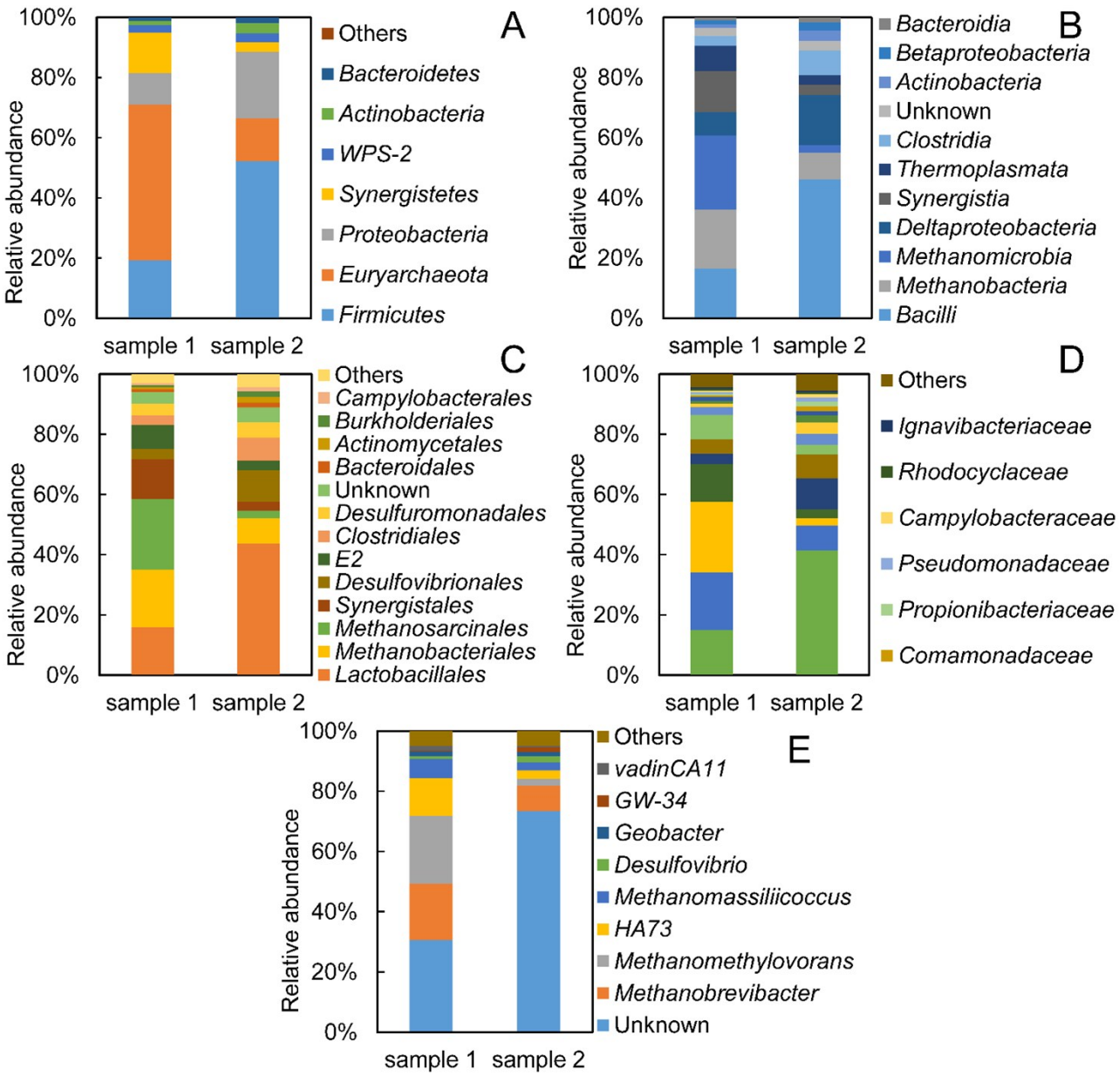

Figure S8. Composition and relative abundance of microbial community at the phylum (A), class (B), order (C), family (D) and genus (E) levels.

Table S1. A summary of the composition of fresh urine

Parameter	Concentration	Parameter	Concentration
pH	5.5-7	Na^+	1800-5800 mg/L
Conductivity	20-24 mS/cm	K^+	1300-3100 mg/L
COD	6000-10000 mg/L	Cl^-	2300-7700 mg/L
TN	7000-9000 mg/L	Mg^{2+}	77-121 mg/L
NH_4^+-N	400-800 mg/L	Ca^{2+}	129-190 mg/L
TP	300-800 mg/L	SO_4^{2-}	748-1500 mg/L

Table S2. Summary of the experimental conditions.

Conditions \ Stage	Acclimation stage	Optimization stage	Nutrient recovery and urine treatment stage
Medium	A mixed medium of glucose solution and fresh real urine	A synthetic source-separated fresh urine	A synthetic source-separated fresh urine
Operational time	About 1 month	6 h/cycle	36 or 24 h/cycle
External resistance	500 Ω gradually reduced to 5 Ω*	Open circuit, 200 Ω, 30 Ω, 5 Ω	5 Ω
Volume ratio of urine/recovery solution	1:1	1:1, 5:1, 20:1	20:1
Flow rate (mL/min)	1	1, 4, 6	6

*: 500 Ω was used when feeding the mixed medium; external resistance was gradually reduced to 5 Ω when feeding the pure fresh real urine.

Table S3. The initial compositions of urine in the urine-powered nutrient recovery and urine treatment

Concentration (mg/L)	COD	TN	TP
Cycle 1	788.2	847.1	52.9
Cycle 2	771.0	840.9	52.7
Cycle 3	775.8	826.0	57.4
Cycle 4	781.5	836.0	58.0
Average	779.1	837.5	55.3

Table S4. Species diversity and abundance index of 2 samples

Sample ID	ACE[a]	Chao1[a]	Shannon[b]	OTU[b]
Sample 1	672	656	4.22	629
Sample 2	687	664	4.15	636

a. The abundance index of microbial community. A higher number represents more abundance.

b. The diversity index. A higher number represents more diversity.

Table S5. The reads number of each sample and operational taxonomic units (OTUs) statistics obtained using the clustering method with a threshold of 0.97

Sample ID	Group	SeqsNum[a]	OTUsNum[b]	EvenSeqsNum[c]	EvenOTUsNum[d]
one	sample 1	207457	630	200000	629
two	sample 2	226126	644	200000	636
Total		433583	837	400000	837

a. SeqsNum is the original sequence number of each sample.

b. OTUsNum is the original OTUs number of each sample.

c. EvenSeqsNum is the normalized sequence number of each sample.

d. EvenOTUsNum is the normalized OTUs number of each sample.

The sample 1 and sample 2 are biofilm samples from the anode in different depth.