Electronic Supplementary Material (ESI) for Environmental Science: Processes & Impacts

Electronic Supplementary Information

Formation and release behavior of iron corrosion products under the influence of bacterial community in simulated water distribution system

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Electronic supplementary information. S1 Detailed procedures of the classification of top layer and inner layer corrosion scales

Fig. S1: Appearances of corroded cast iron coupon surfaces under raw or disinfected tap water conditions in ARs tests

Fig. S2: Turbidity of effluents with time under raw or disinfected tap water conditions in ARs tests

Fig. S3: Shannon-Wiener curves of bacterial community of samples under raw tap water condition in ARs tests

Fig. S4: Taxonomic classification of pyrosequences from the seven bacterial communities under raw tap water condition in ARs tests (a: in phylum level; b: in class level)

Relative sequence abundances of the 11 most abundant phyla (classes) found in the bacterial communities are shown. Sequences that could not be classified into any known group and the other smaller phyla (classes) (relative abundance < 0.1%) in amount are assigned as “Unclassified”.

Fig. S5: Shannon-Wiener curves of the four biofilm samples in an actual DWDS

Table. S1. Water sources and their main average water quality parameters of pipe samples from actual DWDS

Table. S2. Coverage and diversity indices of bacterial 16S rRNA gene libraries

Electronic supplementary information. S1: Detailed procedures of the classification of top layer and inner layer corrosion scales

The top layer was brown and relatively hard, and the inner layer was black and soft. The top layer was scraped slightly first from the cast iron coupons using a sterile spatula, until the color of the corrosion scales was black. Then the inner layer was scraped using another sterile spatula, until the corroded floor was observed. The top layer and inner layer was pulverized using agate mortar respectively, passed through a 150 μm mesh sieve, and then vacuum-freeze-dried.

All of the operations (except vacuum-freeze-dried) were done in an anaerobic glove box.

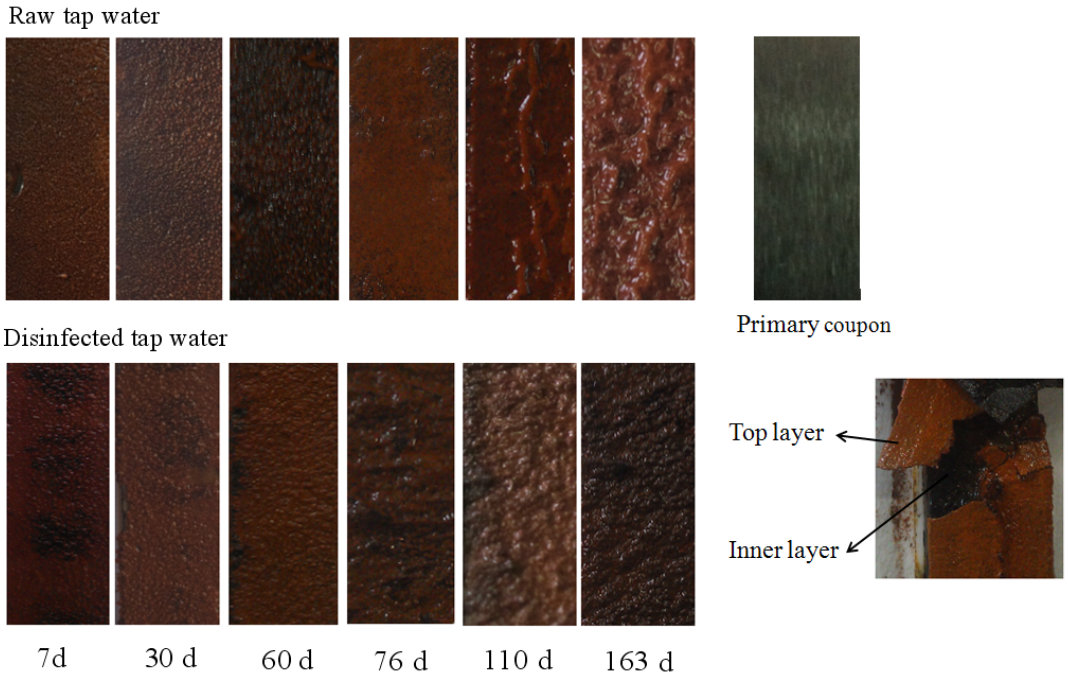


Fig. S1 Appearances of corroded cast iron coupon surfaces under raw or disinfected tap water conditions in ARs tests

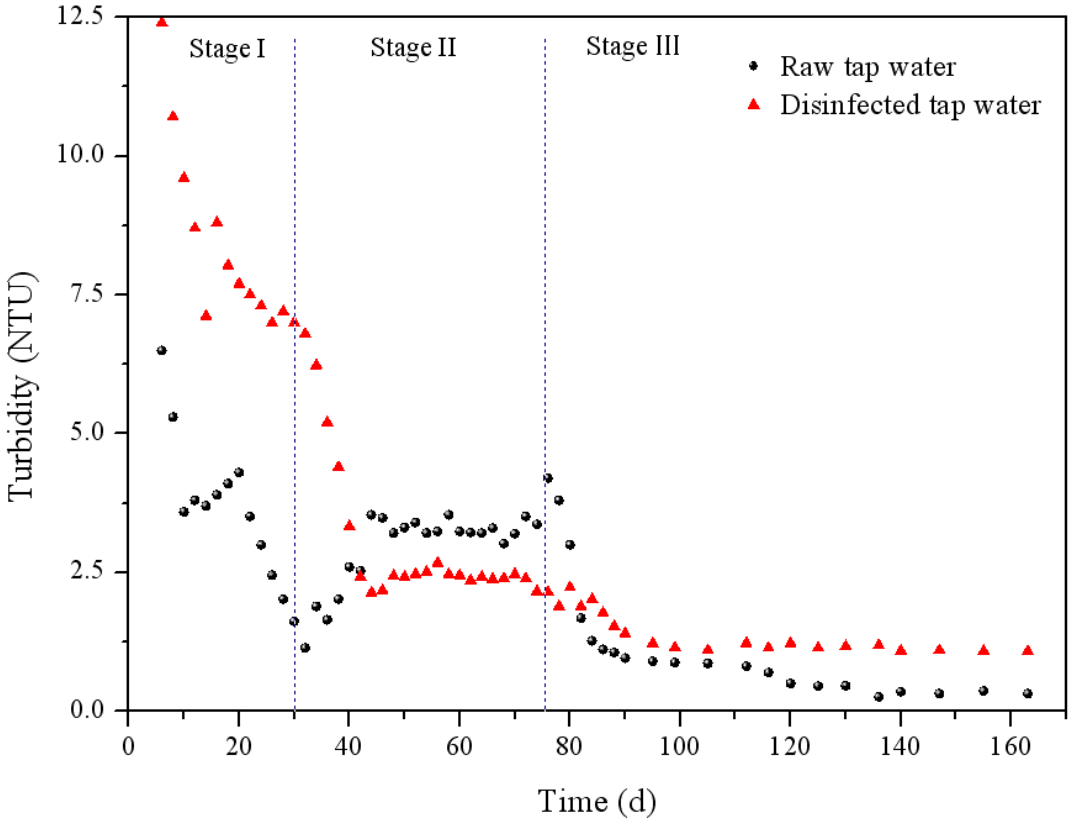


Fig. S2 Turbidity of effluents with time under raw or disinfected tap water conditions in ARs tests

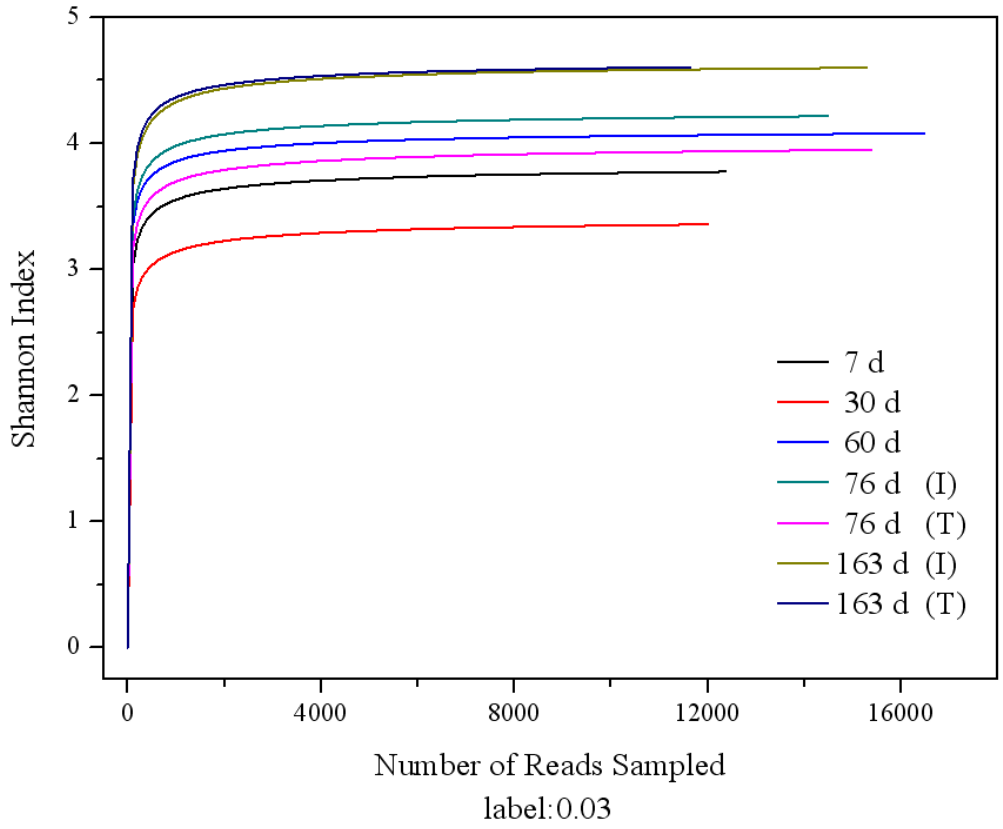
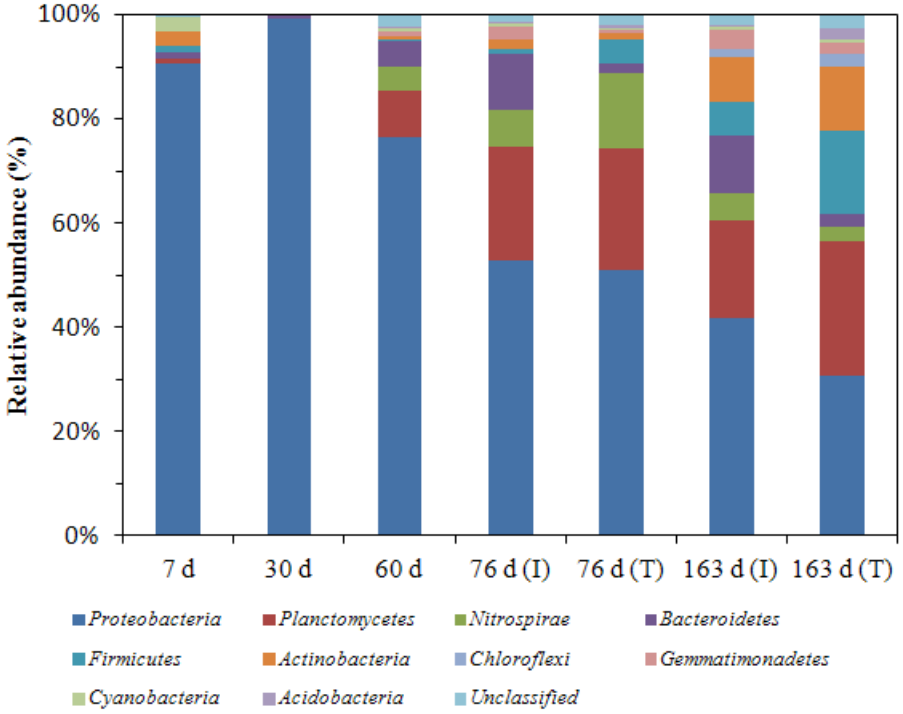
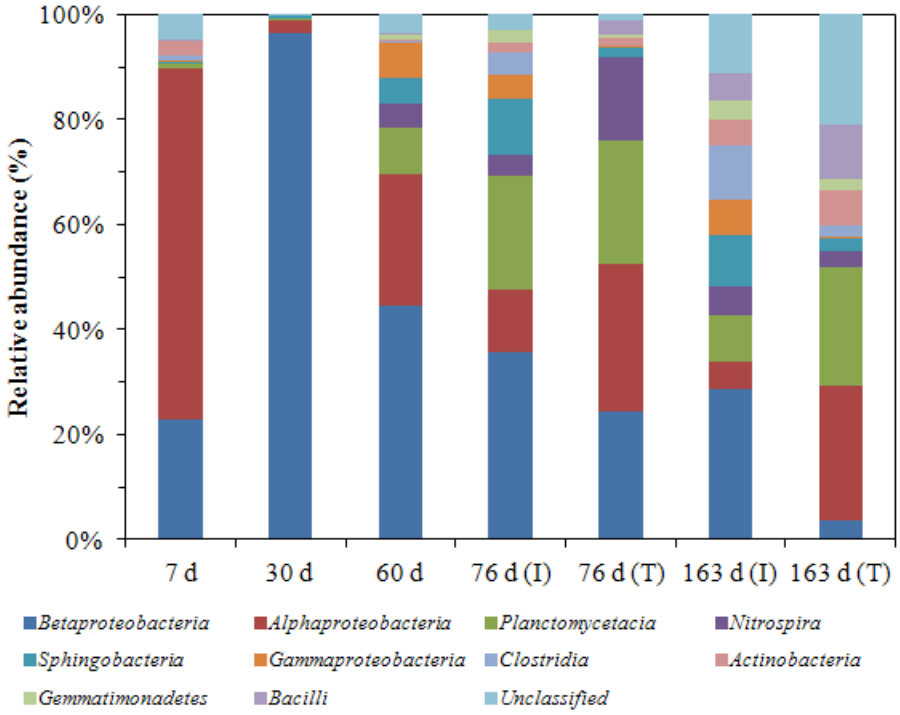


Fig. S3 Shannon-Wiener curves of bacterial community of samples under raw tap water condition in ARs tests



a



b

Fig. S4 Taxonomic classification of pyrosequences from the seven bacterial communities under raw tap water condition in ARs tests (a: in phylum

level; b: in class level)

Relative sequence abundances of the 11 most abundant phyla (classes) found in the bacterial communities are shown. Sequences that could not be classified into any known group and the other smaller phyla (classes) (relative abundance < 0.1%) in amount are assigned as “Unclassified”.

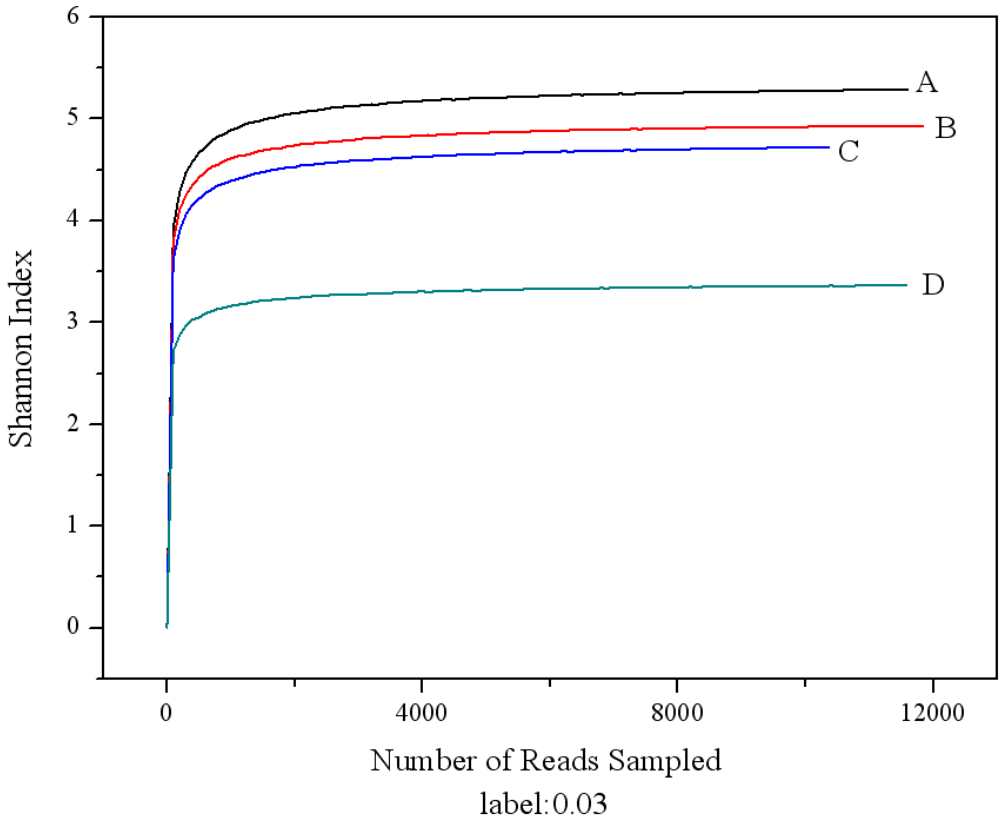


Fig. S5 Shannon-Wiener curves of the four biofilm samples in an actual DWDS

Table. S1 Water sources and their main average water quality parameters of pipe samples from actual DWDS

Water source	SW-1	SW-2	SW-3	GW-1	GW-2
pH	7.85	7.49	7.80	7.71	7.40
Temperature (°C)	20	15	16	14	17
Turbidity (NTU)	0.15	0.24	0.13	0.15	0.29
Alkalinity (mg L^{-1} $CaCO_3$)	140	150	140	200	225
Hardness (mg L^{-1} $CaCO_3$)	182	193	178	214	346
Sulfate (mg L^{-1})	39.8	33.9	41.6	22.0	38.1
Chloride (mg L^{-1})	17.7	17.3	21.1	16.4	15.0
COD_{Mn}(mg L^{-1} O_2)	1.4	0.95	0.87	0.55	0.55
Fe (mg L^{-1})	<0.05	0.11	<0.05	<0.05	<0.05
Mn (mg L^{-1})	<0.001	<0.001	<0.001	<0.001	<0.001
Cu (mg L^{-1})	<0.001	0.003	<0.001	0.003	0.0001
Zn (mg L^{-1})	<0.05	0.07	<0.05	<0.05	<0.05
Ca (mg L^{-1} $CaCO_3$)	104	110	113	125	213
Mg (mg L^{-1} $CaCO_3$)	78	83	66	89	133

Table. S2 Coverage and diversity indices of bacterial 16S rRNA gene libraries

Samples	Reads	OTU	Ace	Chao 1	Coverage	Shannon	Simpson
7 d	11555	632	1478	1089	0.972653	3.36	0.0983
30 d	5677	324	952	728	0.968645	3.00	0.1389
60 d	16491	768	1763	1264	0.977867	4.08	0.0416
76 d (I)*	14492	774	1283	1257	0.975711	4.21	0.0429
76 d (T)**	15400	889	2224	1535	0.971104	3.95	0.0641
163 d (I)	15299	885	1786	1435	0.974966	4.60	0.0279
163 d (T)	11673	732	1804	1251	0.970267	4.60	0.0259
A	11601	1175	2091	1849	0.958452	5.29	0.0184
B	11834	1001	1879	1607	0.963580	4.93	0.0234
C	10369	1004	2532	1828	0.951201	4.72	0.0333
D	11582	642	1636	1166	0.972285	3.36	0.0975

(*I: inner layer; **T: top layer)