Supporting Information

This supplementary material contains 15 pages, 11 tables, 3 figures.

TABLES

Table S1. The parameters of three SBBRs

		SBBR-0	SBBR-1	SBBR-2
MLSS, mg/L		3651	3439	3469
MLVSS, mg/L		2056	2166	2289
SVI, mL/g		80.06	82.17	90.98
Biofilm dry weight, mg/g		33.6	33.6	33.8
pH	Influent	8.2	8.2	8.2
	Anoxic period	7.55	7.55	7.56
	limited-oxygen period	7.32	7.32	7.33
Biofilm thickness, cm		0.58	0.56	0.56

Table S2. Nutrient profile of synthetic wastewater

Substance	Concentration
sodium succinate	0.339 g/L
NH_4Cl	0.191 g/L
$MgSO_4 \cdot 7H_2O$	0.05 g/L
$CaCl_2$	0.019 g/L
KH_2PO	0.03g/L
K_2HPO_4	0.033 g/L
Metal solution	1.1 mL/L
$FeCl_3 \cdot 3H_2O$	5 mg/L
H_3BO_3	0.5 mg/L
$CuSO_4 \cdot 5H_2O$	0.1 mg/L
KI	0.6 mg/L
$MnCl_2 \cdot 4H_2O$	0.4 mg
$Na_2MoO_4 \cdot 2H_2O$	0.2 mg/L
$ZnSO_4 \cdot 7H_2O$	0.4 mg/L
$CoCl_2 \cdot 6H_2O$	0.5 mg/L
EDTA-2Na	5 mg/L

Table S3. Detailed properties of the typical AHLs

AHLs	CAS number	Molecular Formular	Molecular Weight (Da)
C4-HSL	98426-48-3	$C_8H_{13}NO_3$	171.19
3-oxo-C6-HSL	76924-95-3	$C_{10}H_{15}NO_4$	213.23
C6-HSL	106983-28-2	$C_{10}H_{17}NO_3$	199.25
C8-HSL	106983-30-6	$C_{12}H_{21}NO_3$	227.3
C10-HSL	106983-36-2	$C_{14}H_{25}NO_3$	255.35
C12-HSL	18627-38-8	$C_{16}H_{29}NO_3$	283.41
C14-HSL	98206-80-5	$C_{18}H_{33}NO_3$	311.46

AHLs measurements

Table S4. LC-MS/MS conditions

LC condition	Column	Agilent EC-C18, 2.7 μm, 3.0×50 mm, USA
	Column temperature	40℃
	Inject volume	5 μL
	Mobile phase	Water (0.1% acetic acid)/acetonitrile (0.1% acetic acid)
	Flow rate	0.4 mL/min
	Measurement time	5 min
MS/MS condition	Ionization mode	ESI+
	Sheath gas	N_2, 500 L/h
	Capillary	3500 V
	Ion source temperature	300 ℃

Table S5. Parameters for procedure of gradient elution

Time (min)	Solvent A (%)	Solvent B (%)	Flow (mL/min)
0	95	5	0.4
1	95	5	0.4
3	0	100	0.4
5	0	100	0.4

Table S6. Multiple reaction monitoring (MRMs) and MS/MS parameters

AHL	Precursor ion (m/z)	Product ion (m/z)	Fragmentor (V)	Collision Energy (V)
C4-HSL	172.2	102/71	64	9
3-oxo-C6-HSL	214	101.9/71	105	16
C6-HSL	200	101.9/71	100	14
C8-HSL	228.31	102/57.1	110	20
C10-HSL	256.2	102/71.2	130	20
C12-HSL	284.2	183.1/102.1	120	10
C14-HSL	312.2	102.1/57	140	22

PFASs measurements

Table S7. LC-MS/MS conditions

LC condition	Column	Poroshell 120 EC-C18 2.7 μm, 2.1 × 50 mm (Agilent)
	Column temperature	40℃
	Inject volume	1 μL
	Mobile phase	Water (5mmol/L ammonium acetate)/acetonitrile (0.1% acetic acid)
	Flow rate	0.3 mL/min
	Measurement time	20 min
MS/MS condition	Ionization mode	ESI-
	Atomizing gas flow	50 mL/min
	Dry gas	40 mL/min
	Capillary	-4500 V
	Ion source temperature	500 ℃

Table S8. Parameters for procedure of gradient elution

Time (min)	Solvent A (%)	Solvent B (%)	Flow (mL/min)
0	80	20	0.3
14	10	90	0.3
16	10	90	0.3
16.01	80	20	0.3
20	80	20	

Table S9. Multiple reaction monitoring (MRMs) and MS/MS parameters

Objects	Precursor ion (m/z)	Product ion (m/z)	Fragmentor (V)	Collision Energy (V)
PFBA	213	169	40	13
PFPeA	263	219	40	10
PFHxA	313	269	45	13
PFHpA	363	319	30	14
PFOA	413	369	40	14
PFNA	463	419	35	16
PFDA	513	469	40	18
PFUnDA	563	519	70	16
PFDoDA	619	569	70	18
PFTrDA	663	619	65	20
PFTeDA	713	669	85	20
PFHxDA	813	769	90	90
PFODA	913	869	40	25

Table S10. PFOA degradation products in the effluent from two SBBRs

ng/L	SBBR-1	SBBR-2
PFBA	0.498	2.72
PFPeA	0.436	2.78
PFHxA	54.1	167
PFHpA	13.5	32.2
HPFHpA	0.898	1.07

Table S11. Relative abundance (% and log) of *LuxR* family genes in 14 genera

Genus	SBBR-0	SBBR-1	SBBR-2	SBBR-0	SBBR-1	SBBR-2
	%			Log		
Rhodobacter	0.00E+00	1.50E-05	0.00E+00	NA	-4.8236	NA
Candidatus_Accumulibacter	1.14E-03	0.00E+00	0.00E+00	-2.9419	NA	NA
unclassified_Rhodocyclaceae	9.62E-05	0.00E+00	0.00E+00	-4.0170	NA	NA
Brevundimonas	6.47E-05	0.00E+00	0.00E+00	-4.1893	NA	NA
Bordetella	0.00E+00	3.27E-05	2.07E-05	NA	-4.4850	-4.6839
unclassified_Rhodobacterales_genus	0.00E+00	1.37E-04	3.78E-05	NA	-3.8627	-4.4226
unclassified_Gammaproteobacteria_genus	0.00E+00	1.46E-05	6.14E-05	NA	-4.8366	-4.2117
unclassified_Betaproteobacteria_genus	0.00E+00	2.97E-05	7.82E-05	NA	-4.5278	-4.1070
Acidovorax	0.00E+00	1.72E-04	1.33E-04	NA	-3.7632	-3.8773
Comamonas	0.00E+00	4.51E-04	1.98E-04	NA	-3.3454	-3.7024
Azonexus	0.00E+00	2.67E-04	3.39E-04	NA	-3.5732	-3.4696
Sulfuritalea	1.42E-04	7.67E-05	3.83E-04	-3.8466	-4.1155	-3.4165
unclassified_Pseudomonadota_genus	0.00E+00	1.84E-04	3.98E-04	NA	-3.7342	-3.4002
Dechloromonas	3.07E-04	3.47E-04	4.26E-04	-3.5123	-3.4600	-3.3711
Diaphorobacter	0.00E+00	3.69E-04	7.05E-04	NA	-3.4326	-3.1517
Alicycliphilus	0.00E+00	2.97E-03	1.64E-03	NA	-2.5278	-2.7865
Thauera	3.24E-03	4.16E-03	5.77E-03	-2.4896	-2.3804	-2.2391

*** The first three columns represent the relative abundance as percentages, while the latter three columns display the logarithmic values of these percentages.**

FIGURES

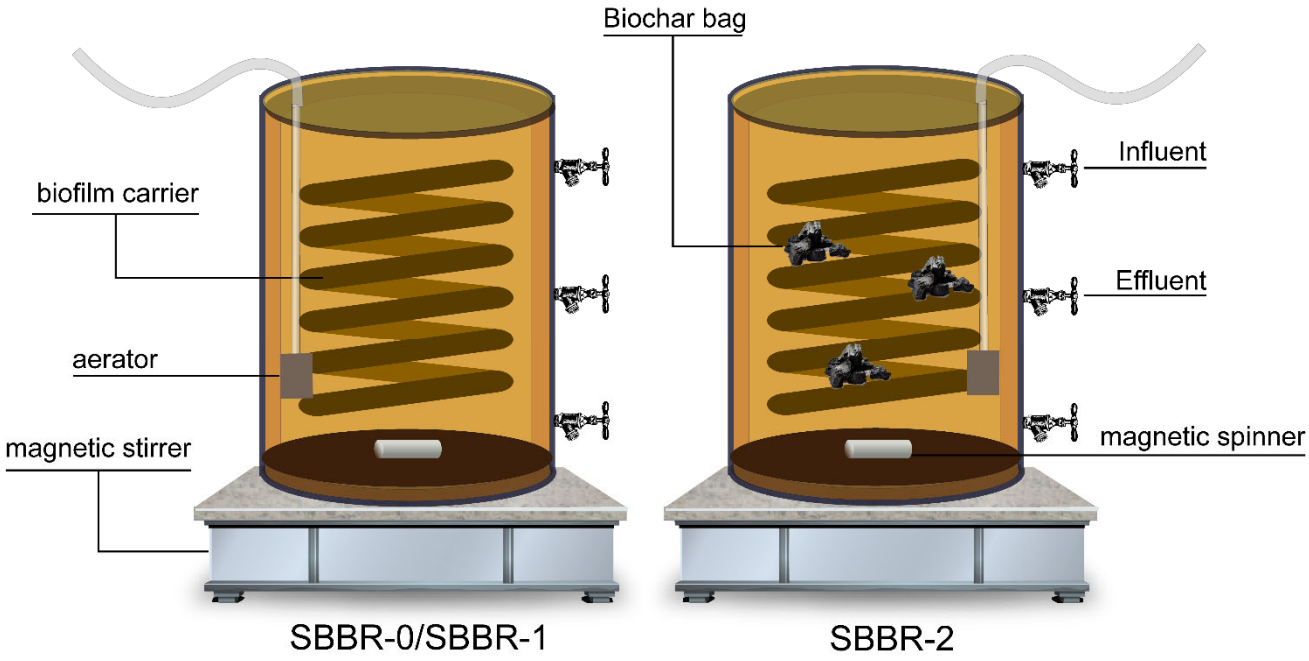

Figure S1. The schematic diagram of the SBBRs

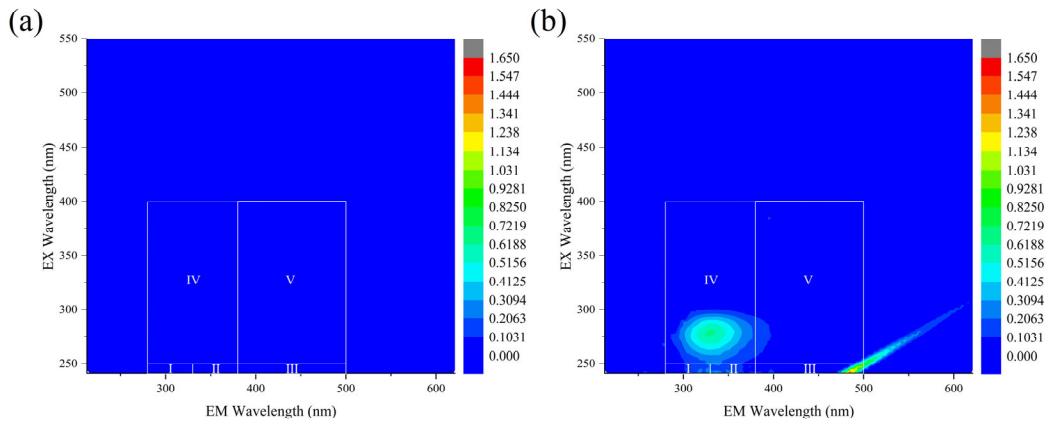

Figure S2. EEM images of the biomass on the biochar. (a) The raw biochar; (b) The used biochar.

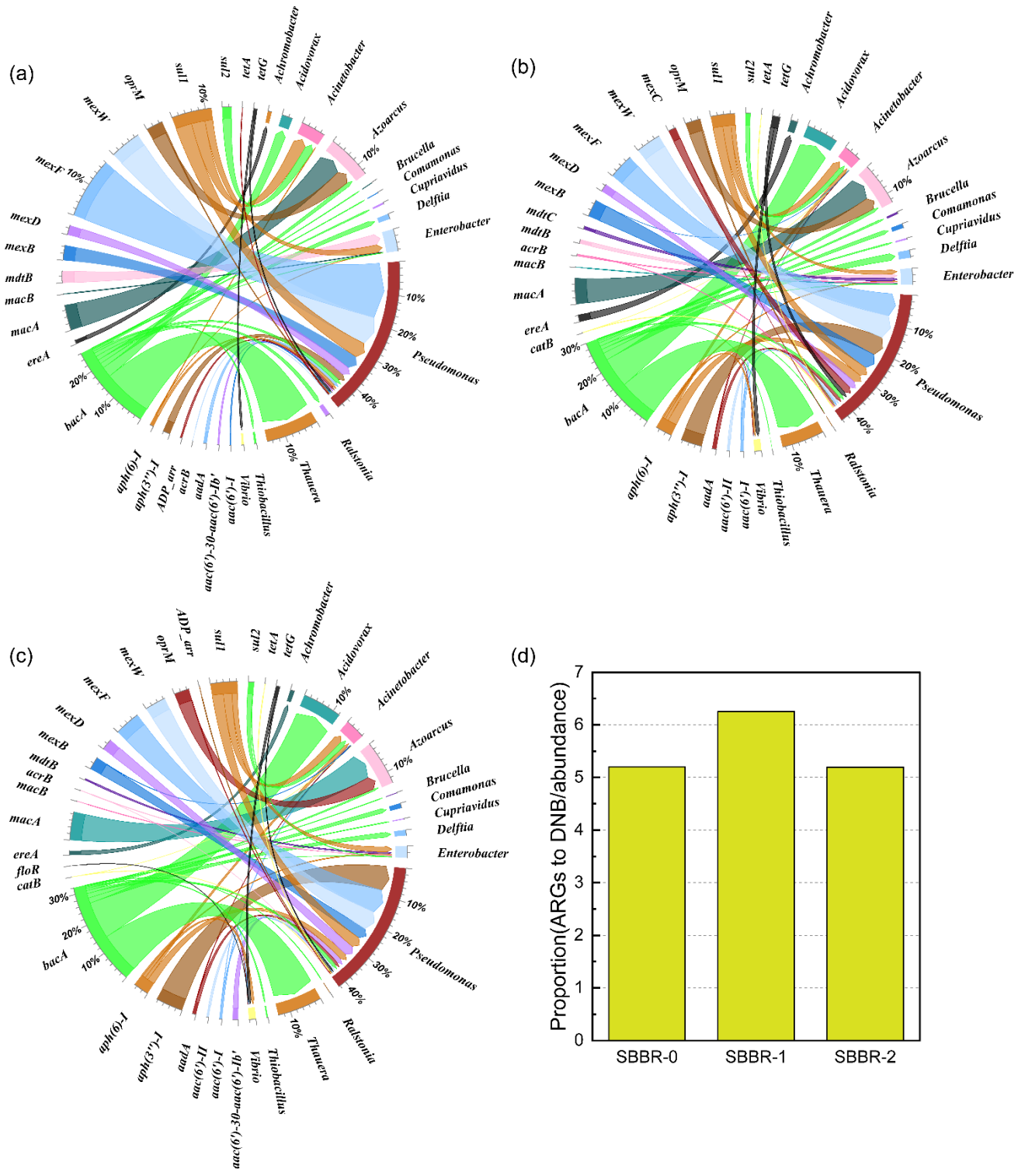

Figure S3. Circos plot of the top 30 abundant ARGs subtypes and taxonomic origin in (a) SBBR-0, (b) SBBR-1, (c) SBBR-2. (d) The ratio of ARG relative abundance to denitrifying bacteria relative abundance in the SBBR-0, SBBR-1, and SBBR-2.