Supplementary Material

Effects of size and spacing of basalt fiber carrier media on performance, extracellular polymeric substances and microbial community of hybrid biological reactors

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Fig. S1

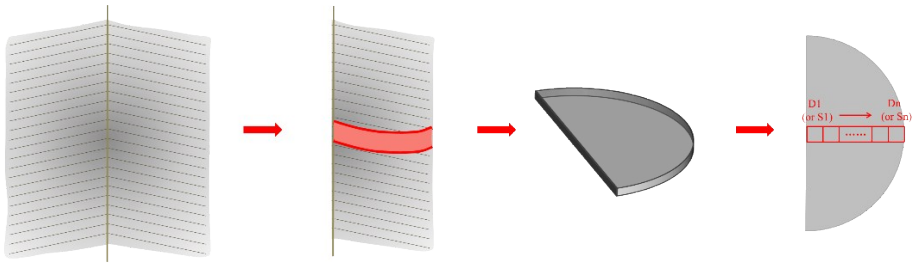

Fig. S1 Illustration of collecting samples from frozen bio-nest for EPS and DNA extract analysis

Fig. S2

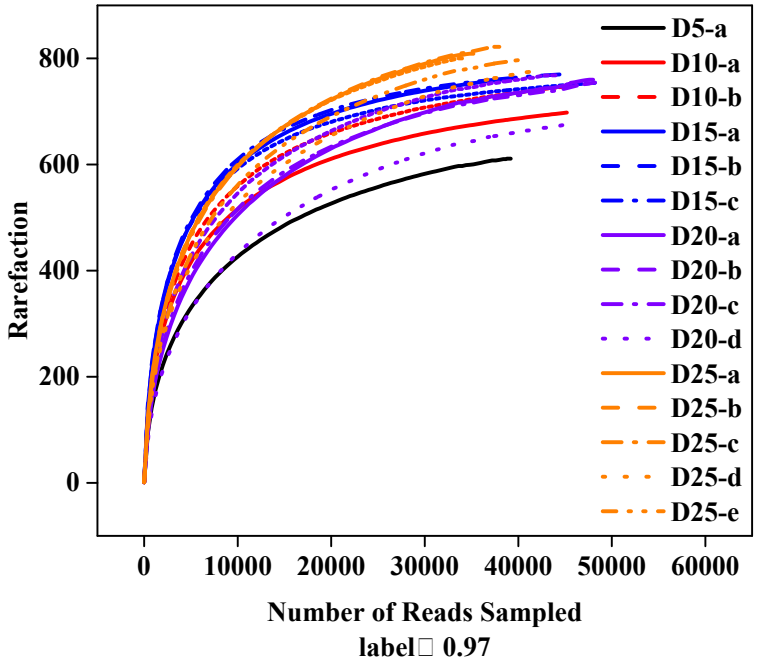

Fig. S2 Rarefaction curves of samples at different depth of bio-nests with carrier size at 5.0 cm, 10.0 cm, 15.0 cm, 20.0 cm and 25.0 cm

Fig. S3

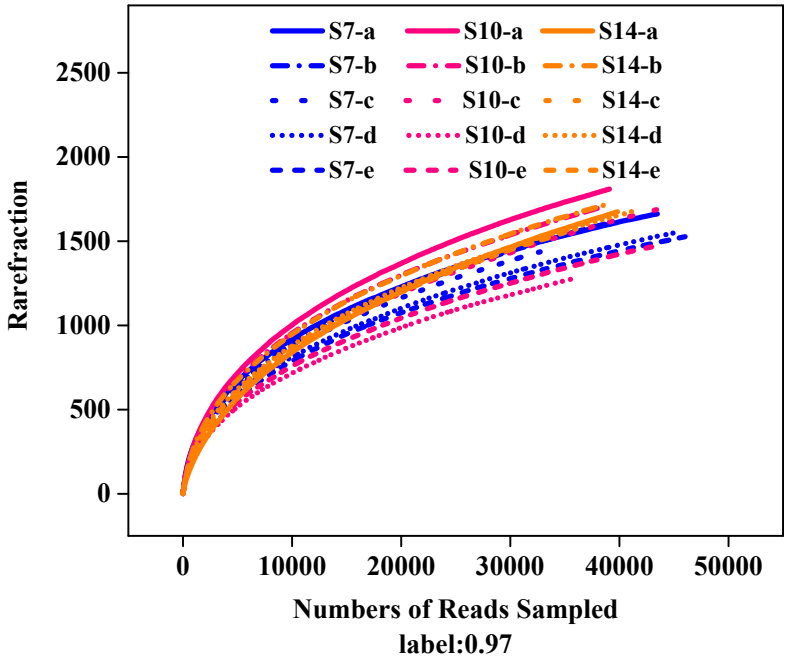

Fig. S3 Rarefaction curves of samples at different depth of bio-nests with carrier spacing at 7.0 cm, 10.0 cm and 14.0 cm.

Table S1 Content and composition of extracted EPS from samples collected in the 1st experiment period.

EPS composition		Sliced samples														
（mg·g^{-1} VSS）		D5	D10		D15			D20				D25				
		1	1	2	1	2	3	1	2	3	4	1	2	3	4	
S-EPS	PN	50	47	34	13	18	63	72	86	108	89	24	78	85	94	85
	PS	64	44	24	12	24	47	44	42	41	56	15	36	38	42	49
	PN+PS	114	91	58	25	42	110	116	128	149	145	39	114	123	136	134
	Total	135	112	87	32	51	145	129	144	174	170	57	128	143	151	163
	PN/PS	0.78	1.07	1.42	1.08	0.75	1.34	1.64	2.05	2.63	1.59	1.60	2.17	2.24	2.24	1.73
	%S-EPS	0.35	0.40	0.25	0.15	0.20	0.31	0.41	0.46	0.49	0.43	0.35	0.39	0.37	0.42	0.43
LB-EPS	PN	34	29	13	20	28	44	15	9	7	3	13	14	22	24	27
	PS	36	14	6	10	19	20	17	9	9	5	10	13	15	11	26
	PN+PS	70	43	19	30	87	64	32	18	16	8	23	27	37	35	53
	Total	83	65	33	40	65	80	54	21	27	13	31	34	67	72	75
	PN/PS	0.94	2.07	2.17	2.00	1.47	2.20	0.88	1.00	0.78	0.60	1.30	1.08	1.47	2.18	1.04
	%LB-EPS	0.21	0.23	0.09	0.19	0.25	0.17	0.17	0.07	0.08	0.03	0.19	0.10	0.17	0.20	0.20
TB-EPS	PN	83	60	116	70	79	112	54	58	53	102	29	53	56	44	42
	PS	55	31	86	49	55	89	60	56	67	84	38	78	83	71	76
	PN+PS	138	91	202	119	134	201	114	114	120	186	67	131	139	115	118
	Total	173	103	235	141	145	248	134	146	153	214	74	169	175	136	140
	PN/PS	1.51	1.94	1.35	1.43	1.44	1.26	0.90	1.04	0.79	1.21	0.76	0.68	0.67	0.62	0.55
	%TB-EPS	0.44	0.37	0.66	0.66	0.56	0.52	0.42	0.47	0.43	0.54	0.46	0.51	0.45	0.38	0.37
Total EPS	PN	167	136	163	103	125	219	141	153	168	194	66	145	163	162	154
	PS	155	89	116	71	98	156	121	107	117	145	63	127	136	124	151
	PN+PS	322	225	279	174	223	375	262	260	285	339	129	272	299	286	305
	Total	391	280	355	213	261	473	317	311	354	397	162	331	385	359	378
	PN/PS	1.08	1.53	1.41	1.45	1.28	1.40	1.17	1.43	1.44	1.34	1.05	1.14	1.20	1.31	1.02
TBEPS/LBEPS		2.08	1.58	7.12	3.53	2.23	3.10	2.48	6.95	5.67	16.46	2.39	4.97	2.61	1.89	1.87

Table S2 The number of sequence and community diversity from each sample of bio-nest at different depth in the 2nd experimental period.

EPS composition		Sliced samples														
（mg·g^{-1} VSS）		S-7					S-10					S-14				
		S7-1	S7-2	F7-3	F7-4	F7-5	S10-1	S10-2	F10-3	F10-4	F10-5	S14-1	S14-2	F14-3	F14-4	F14-5
S-EPS	PN	48	54	88	93	114	63	78	104	114	146	27	33	45	53	87
	PS	10	15	30	39	70	30	63	52	65	75	18	24	35	45	24
	PN+PS	58	69	118	132	184	93	141	156	179	221	45	57	80	98	111
	Total	73	84	126	173	233	127	185	196	217	261	60	83	92	116	124
	PN/PS	4.80	3.60	2.93	2.38	1.63	2.10	1.24	2.00	1.75	1.95	1.50	1.38	1.29	1.18	3.63
	%S-EPS	0.40	0.35	0.43	0.43	0.39	0.52	0.58	0.50	0.47	0.48	0.26	0.30	0.28	0.29	0.27
LB-EPS	PN	29	44	60	60	92	12	25	36	70	72	12	18	32	50	70
	PS	6	22	21	30	35	6	18	25	35	50	8	24	30	36	49
	PN+PS	35	66	81	90	127	18	43	61	105	122	20	42	62	86	119
	Total	57	87	96	108	163	39	49	84	134	140	36	54	88	106	142
	PN/PS	4.83	2.00	2.86	2.00	2.63	2.00	1.39	1.44	2.00	1.44	1.50	0.75	1.07	1.39	1.43
	%LB-EPS	0.31	0.37	0.33	0.27	0.27	0.16	0.15	0.22	0.29	0.26	0.15	0.19	0.27	0.27	0.31
TB-EPS	PN	27	37	38	60	70	15	10	33	39	45	65	70	80	93	110
	PS	15	13	18	46	67	50	64	36	62	71	46	32	25	35	56
	PN+PS	42	50	56	106	137	65	74	69	101	116	111	102	105	128	166
	Total	51	67	71	120	199	79	84	109	111	139	139	141	145	178	192
	PN/PS	1.80	2.85	2.11	1.30	1.04	0.30	0.16	0.92	0.63	0.63	1.41	2.19	3.20	2.66	1.96
	%TB-EPS	0.28	0.28	0.24	0.30	0.33	0.32	0.26	0.28	0.24	0.26	0.59	0.51	0.45	0.45	0.42
Total EPS	PN	104	135	186	213	276	90	113	173	223	263	104	121	157	196	267
	PS	31	50	69	115	172	86	145	113	162	196	72	80	90	116	129
	PN+PS	135	185	254	328	453	176	258	286	385	459	176	201	247	312	396
	Total	181	238	293	401	595	245	318	389	462	540	235	278	325	400	458
	PN/PS	3.35	2.70	2.70	1.85	1.60	1.05	0.78	1.53	1.38	1.34	1.44	1.51	1.74	1.69	2.07
TBEPS/LBEPS		0.89	0.77	0.74	1.11	1.22	2.03	1.71	1.30	0.83	0.99	3.86	2.61	1.65	1.68	1.35

Table S3 The number of sequence and community diversity from each sample of bio-nest at different depth in the 1st experimental period.

Sample	Reads	OTU	Chao1	ACE	Shannon
D5-a	35313	634	702.5698	707.0731	3.854578
D10-a	55195	828	752.2174	746.662005	4.471216
D10-b	55109	889	791.575	791.61576	4.366309
D15-a	52972	901	798.038	799.806209	4.832881
D15-b	62857	913	784.0545	779.401611	4.850527
D15-c	54835	931	784.3784	788.163614	4.770873
D20-a	42568	845	867.645161	855.100007	4.118644
D20-b	37492	871	862.797872	857.836346	4.358815
D20-c	56024	892	850.879121	850.075413	4.118702
D20-d	40814	744	812.413043	800.549996	3.662508
D25-a	32978	864	889.901639	906.22751	4.784613
D25-b	32886	858	898.282828	893.256008	4.812928
D25-c	35769	878	907.086207	914.590098	4.663805
D25-d	38171	808	901.378378	915.951159	4.258644
D25-e	38219	826	897.809524	896.708283	4.201706

Table S4 The number of sequence and community diversity from each sample of bio-nest at different depth in the 2nd experimental period.

Sample	Reads	OTU	Chao1	ACE	Shannon
S7-a	43484	1662	2401.717	2807.979	5.135992
S7-b	39576	1617	2591.171	3173.641	4.904461
S7-c	32761	1437	2432.355	3025.386	4.730083
S7-d	45367	1554	2302.414	2984.03	4.694634
S7-e	46374	1531	2346.577	2880.471	4.259231
S10-a	39087	1809	2713.243	3208.903	4.765271
S10-b	38490	1703	2630.439	3164.148	4.69282
S10-c	44691	1709	2680.113	3535.116	4.184476
S10-d	35636	1275	2062.682	2886.719	3.896149
S10-e	43440	1473	2574.953	3310.591	4.409277
S14-a	39834	1674	2686.021	3437.517	3.364891
S14-b	38716	1716	2738.832	3342.572	4.506304
S14-c	33999	1549	2558.784	3269.686	4.005718
S14-d	41260	1678	2605.773	3345.208	4.476093
S14-e	36050	1573	2609.513	3273.387	4.264148