Supporting Information

Low Cost Liquid Crystal Display (LCD) Printed Microfluidic Device: Fabrication and its Application towards Biodegradation of Petroleum Hydrocarbons in Petroleum Refinery Sludge

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Table S1. Roughness factors of bare and biofilm coated 3D-printed carrier surface from atomic force microscopic topographic analysis.

SN	**Topography**	**S_q**	**Sp**	**S_v**	**S_z**	**S_a**
1	Bare	0.0933	0.249	0.323	0.572	0.0749
2	7th Day	0.0349	0.158	0.190	0.347	0.0260
3	15th Day	0.0885	0.275	0.304	0.580	0.0689
4	22nd Day	0.162	0.453	0.584	1.04	0.129

S_q: Root mean square height, Sp: Maximum peak height, S_v: Maximum pit height, S_z: Maximum height, S_a: Arithmetic mean height.

Sample	**Mean RMS ± SD**	**Mean RMS ± SD**
Untreated	97.33 ± 4.51	97.33 ± 2.60
3 days	33.33 ± 3.06	33.33 ± 1.77

7 days	87.00 ± 4.36	87.00 ± 2.52
15 days	157.33 ± 4.51	157.33 ± 2.60

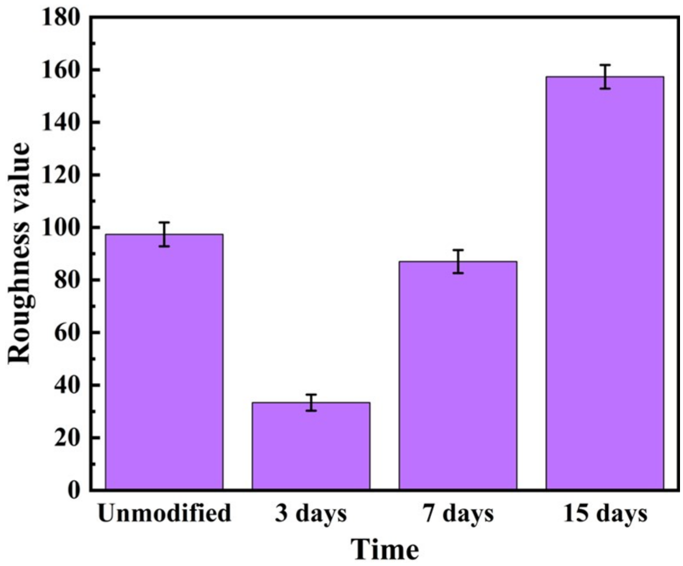

Figure S1. Deviation of RMS values of the biofilm coated microchannels over a period of 15 days.

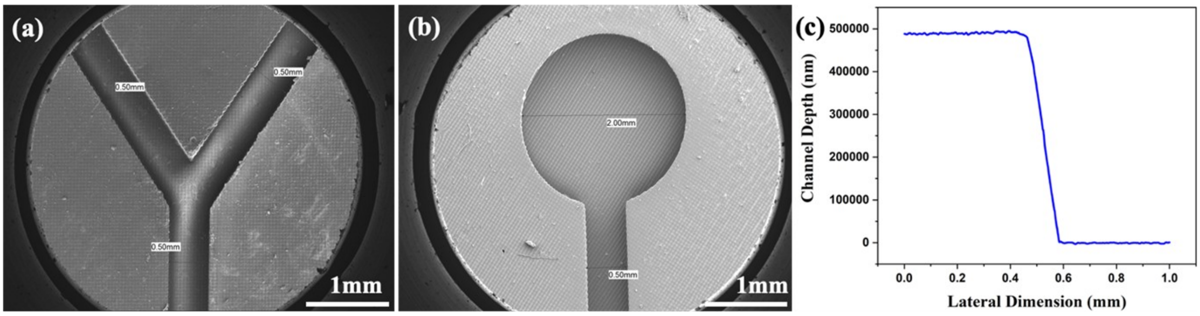

Fig.S2. Dimensional analysis of microchannel (a) SEM image of y cross-section, (b) SEM image of inlet and (c) channel depth measurement using profilometry.

Table S2. Mechanical characterization of the 3D-printed sample

Sample	Stress (MPa)	Strain (%)	Modulus (MPa) [Take 0.01-0.5 %]	Toughness (MJ/m^3)
Uncured	5.07	6.01	156.4	0.18
1 min	9.04	6.48	323.5	0.38
5 min	18.57	4.08	1065.3	0.52
10 min	21.63	3.24	1298.9	0.45

Sample	Mean Stress ± SD	Mean Stress ± SD

Untreated	4.99 ± 0.31	4.99 ± 0.18
1 min	9.25 ± 0.86	9.25 ± 0.50
5 min	17.56 ± 1.16	17.56 ± 1.16
10 min	21.47 ± 1.03	21.47 ± 0.60

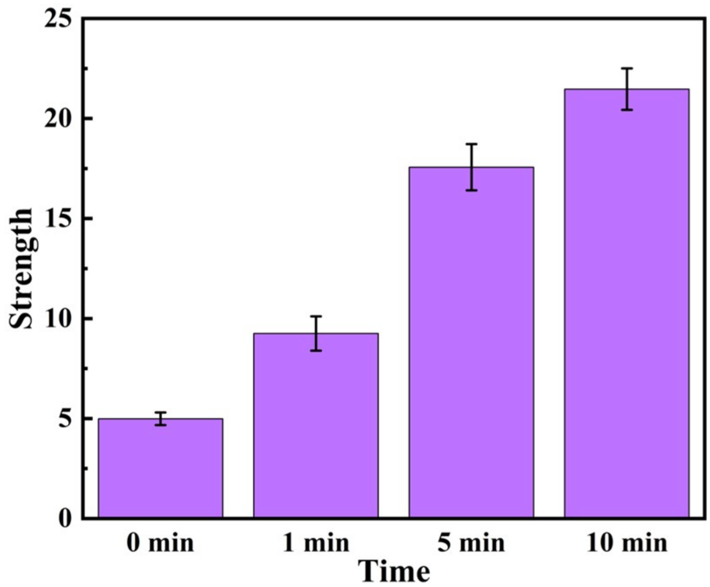

Fig. S3. Deviation in the mechanical strength of the 3D-printed samples.

Table S3. GC MS spectrum analysis of hydrocarbon degradation of control sample

PEAK NO.	COMPOUND NAME	Mol. Wt.
1	HEPTACOSANE	414
2	CARBONIC ACID, OCTADECYL VINYL ESTER	340
3	TETRAPENTACONTANE, 1,54-DIBROMO-	914
4	1-DODECANOL,	298
5	BENZENE, 1,3-BIS(1,1-DIMETHYLETHYL)-	190
6	OCTADECANE, 1-CHLORO-	288
7	1-DECANOL, 2-HEXYL-	242
8	1-DODECANOL, 2-HEXYL-	270
9	TRITETRACONTANE	604

10	BEHENYL CHLORIDE	344
11	OCTATRIACONTANE, 1,38-DIBROMO-	690
12	TRIACONTANE, 1,30-DIBROMO-	578
13	1-CHLOROEICOSANE	316
14	OCTACOSYL TRIFLUOROACETATE	506
15	17-PENTATRIACONTENE	490
16	2-METHYLHEXACOSANE	380
17	TRIACONTANE, 11,20-DIDECYL-	702
18	HEXACOSYL PENTAFLUOROPROPIONATE	528
19	1-DECANOL, 2-OCTYL-	298
20	1-DECANOL, 2-HEXYL-	242
21	1-DECANOL, 2-HEXYL-	242
22	PIPERZINE	86

Table S4. GC MS spectrum analysis of hydrocarbon degradation after 3 days

PEAK NO.	COMPOUND NAME	Mol. Wt.
1	HEXADECANE, 2,6,10,14-TETRAMETHYL-	282
2	NONADECANE, 9-METHYL-	282
3	HEXADECANE, 2,6,11,15-TETRAMETHYL-	282
4	HEPTADECANE, 7-METHYL-	254
5	PIPERAZINE, 2-METHYL	100
6	BENZENE, 1,3-BIS(1,1-DIMETHYLETHYL)-	190
7	3,7,11,15-TRIMETHYLHEXADECANOIC ACID, 2,2,2- TRIFLUOROETHYL ESTER	394
8	ETHER, DODECYL ISOPROPYL	228
9	3,5-DIMETHYLDODECANE	198
10	UNDECANE, 5-ETHYL-5-PROPYL-	226
11	OCT-3-ENOYLAMIDE, N-METHYL-N-(2-ETHYLHEXYL)-	267

12	11-METHYLHENTRIACONTANE	450
13	TETRACOSANE	338
14	HENEICOSANE	296
15	ALLYL UNDECANOATE	226
16	5-ETHYLHEPTADECANE	268

Table S5. GC MS spectrum analysis of hydrocarbon degradation after 15 days

PEAK NO.	**COMPOUND NAME**	**Mol. Wt.**
1	PIPERAZINE	86
2	3,5-DIMETHYLDODECANE	198
3	OCT-3-ENOYLAMIDE, N-METHYL-N-HEXADECYL-	379
4	EICOSANE, 1-IODO-	408
5	DECANE, 2,3,7-TRIMETHYL-	184
6	2-BROMOTETRADECANE	276