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New multifunctional biocomposite material for hydrocarbon detection and reclamation on the surface of water areas

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Contents

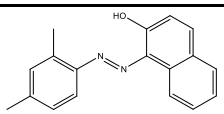
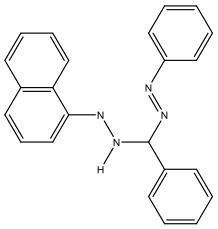
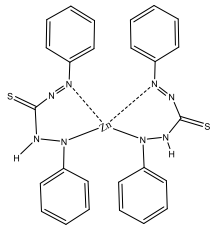
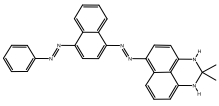
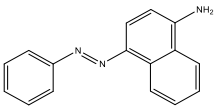
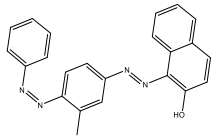
S1 Biodegradation of model mixture of hydrocarbons by BCM in artificial sea water

The samples of BCM (6 cm x 6 cm) were placed into 250-mL flasks with 100 ml of the artificial sea water and 1% (vol.) of model mixture of hydrocarbons. Un-inoculated artificial sea water with 1% (vol.) of model mixture of hydrocarbons was used to monitor the abiotic loss of hydrocarbons (control). All flasks were shaked (150 rpm) at 24-25ºC for up to 21 days. At 21 day, a flask for each condition tested was removed and its entire content was used to determine hydrocarbons degradation both in the artificial sea water and in the BCM. The residual hydrocarbons were extracted from artificial sea water with n-hexane. Samples of BCM were removed and 20 mL of n-hexane were added to each flask, the mixture was shaken and allowed to stand for 5 min for phase separation. The extraction was repeated three times and obtained hydrophobic fractions were combined and dried over anhydrous Na_2SO_4.

To extract the residual hydrocarbons from BCM, samples were placed into flasks with n-hexane (20 mL) and sonicated in an ultrasonic bath (P30H, Elma Gmbh, Singer, Germany). The extraction was carried out three times and the hydrophobic fractions were combined. The change in the individual hydrocarbon composition in the extracts were followed with GC/MS Thermo Scientific ISQ-TRACE 1300 (USA) equipped with a capillary column (Thermo Scientific TR-5MS, length 30.0 m, inner diameter 0.25 mm, film thicknesses 0.25 mm). The GC/MS operational conditions were as follows: initial oven temperature e 50ºC, oven temperature program: from 50 to 300ºC at 10 C/min, MSD scan range 50e650 amu, scan rate 5.0 scan/s, electron energy 70 eV. Helium at a flow rate of 1 mL min^{-1} was used as the carrier gas. Methyl ether of stearic acid ($C_{17}H_{35}COOCH_3$) (Acros Organics, Belgium) was used as the internal standard. The mass spectra

database NIST/EPA/NIH 11 was used for the hydrocarbon identification. The extent of hydrocarbons biodegradation after treatment with BCM was estimated by comparing the residual levels of the hydrocarbons in the artificial sea water and in BCM. Under the specified conditions, at least two independent experiments were carried out each in triplicate.

Table S1 The ability of threads saturated with various indicator reagents to form the analytical signal in reaction with various hydrocarbons solid-phase reagents.

INDICATOR SUBSTANCES	BENZENE, TOLUENE, O-XYLENE, NONYLBENZENE, ISODECANE	1,2,4-TRIMETHYLBENZENE	ISOPROPYL BENZENE, ISOOCTANE	HEXANE	DODECANE	TRIDECANE PENTADECANE, HEXADECANE, DODECENE	DECYLCYCLOHEXANE
		+				-	
		+		+		+	+
							
							
							-
 S							-

+ Analytical signal.
- No analytical signal.