Supporting Information

Juncus pith: A versatile material for automatic and continuous separation of various oil-water mixtures

Fatang Liu,[†] Rui Lu,[†] Qinmin Pan*[,†]

7 pages of supporting data, including 6 pictures and 2 tables.

Figure S1. FT-IR spectra and possible structures of some components[1] of the juncus pith.

Figure S2. Separation of (a) hexane-water mixture, (b) CHCl3-water mixture and (c) crude oil-water mixture by juncus piths. (d) Fluorescent images recording the separation of CHCl3-water mixture. Inset of (b) is the water contact angle of the CHCl3-wetted pith in air. The hexane, CHCl3 and water were dyed with solvent yellow 14, solvent red 24 and fluorescent yellow-green, respectively.

Table S1. Water content of the oils collected from the immiscible oil-water mixtures.

Figure S3. Separation of ternary hexane/water/$CHCl_3$ mixture by a single juncus pith. The hexane and $CHCl_3$ were dyed by solvent yellow 14 and red 24, respectively.

Figure S4. Climbing height of oils on juncus piths as a function of time.

Figure S5. (a) Separation of *n*-dodecane (red dyed) from water surface by bundled piths. (b) Stress-strain curve of individual pith.

Figure S6. Photographs and microscopic images of the span80-stabilized (a) water-in-toluene (W/T), (b) water-in-octane (W/O) and (c) water-in-dodecane (W/D) emulsions before (left) and after (right) separation by a juncus pith. All the emulsions had a water content of 1 wt%.

Table S2. Water content of the oils collected from the water-in-oil emulsions.

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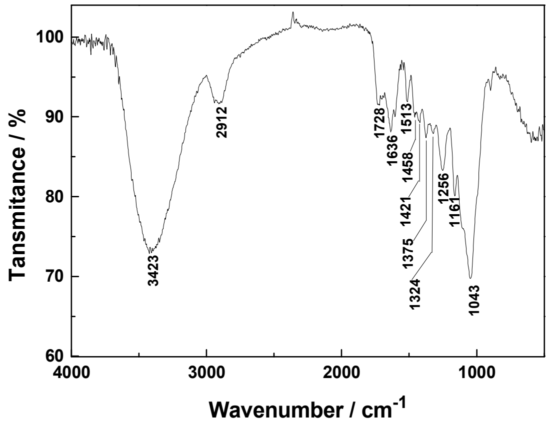

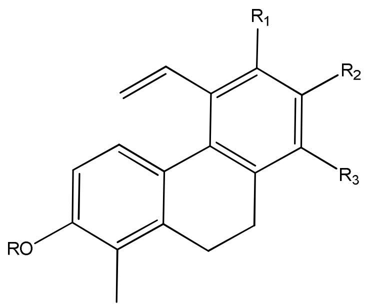

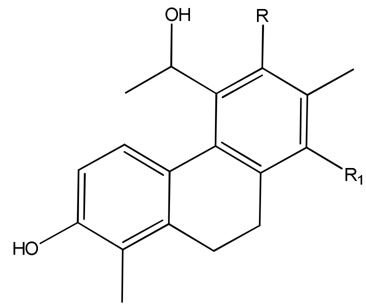

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6	R=H	R_1=Me	R_2=OH	R_3=H
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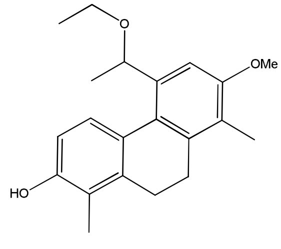

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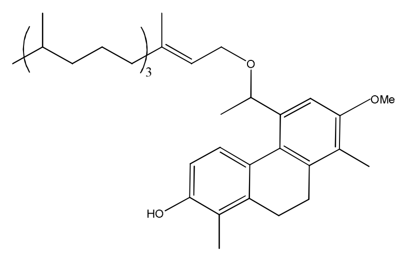

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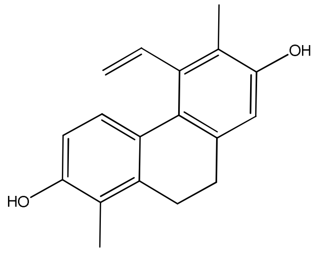

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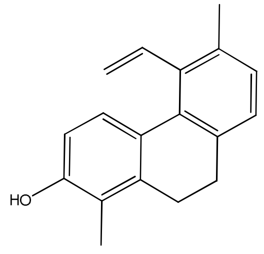

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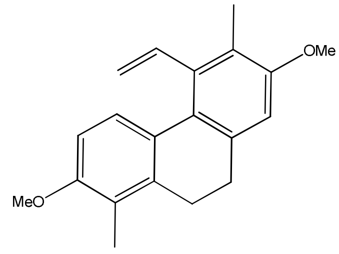

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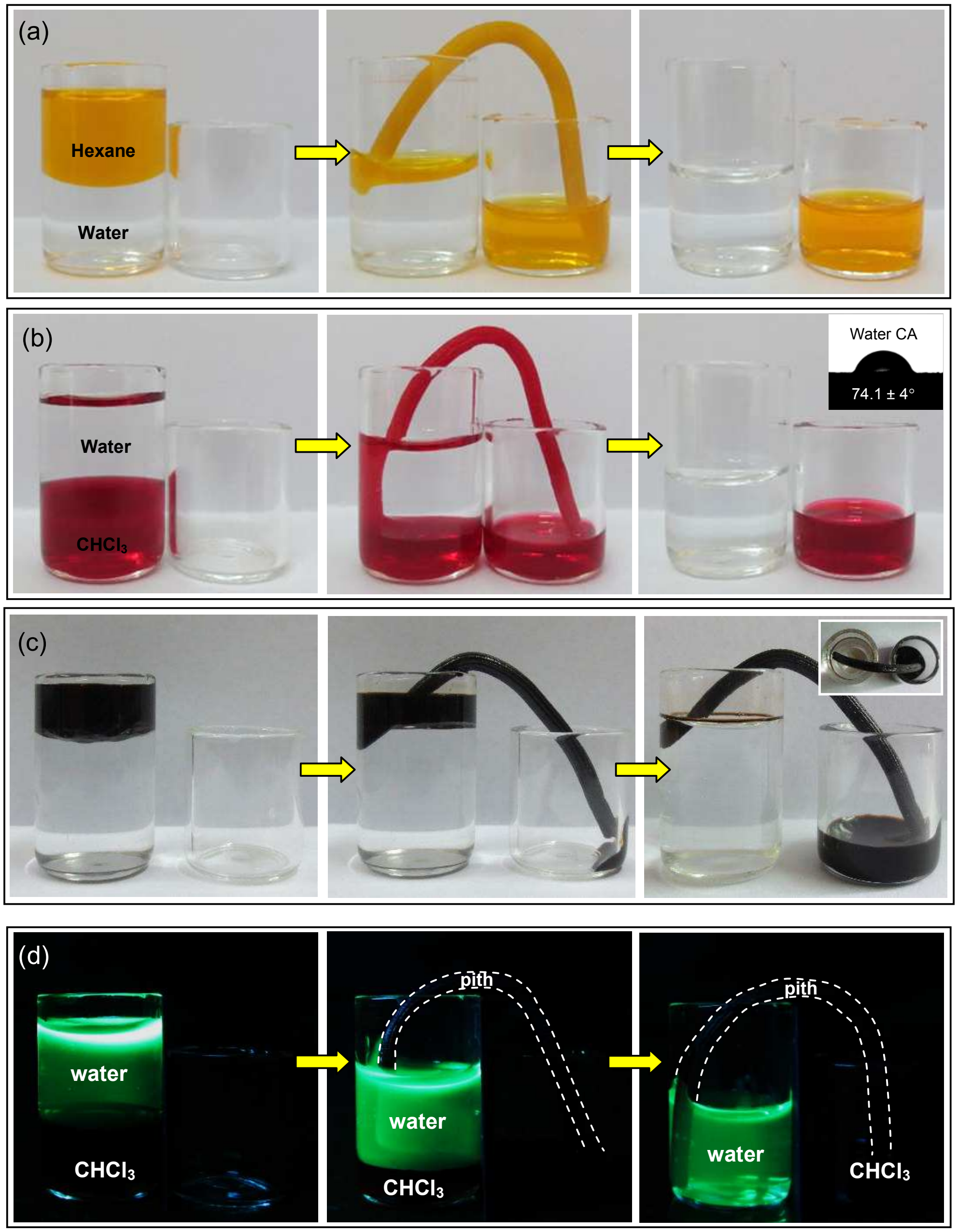

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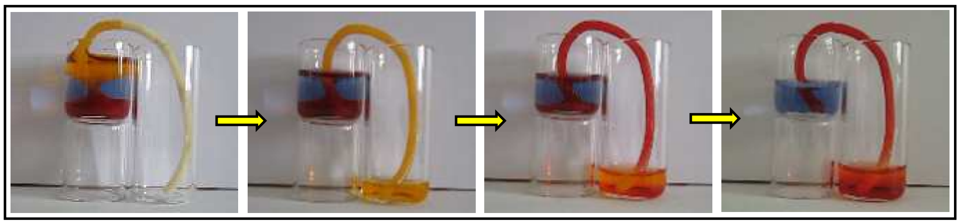
Table S1. Water content of the oils collected from the immiscible oil-water mixtures.

Oil-water mixtures	Hexane-water	Chloroform-water*	Dodecane-water
Water content of the collected oils / ppm	82.8	336.2	44.5

*Note that the original $CHCl_3$ contains ~197.5 ppm water. This means that the pith has a separation efficiency of ~99.98% for the $CHCl_3$-water mixture.



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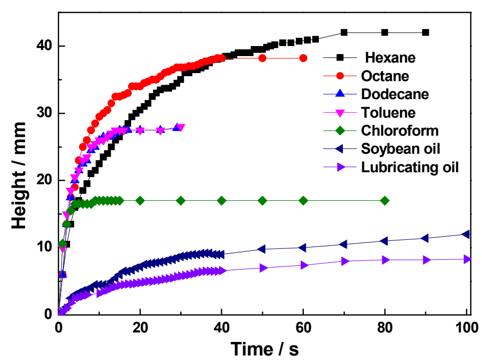
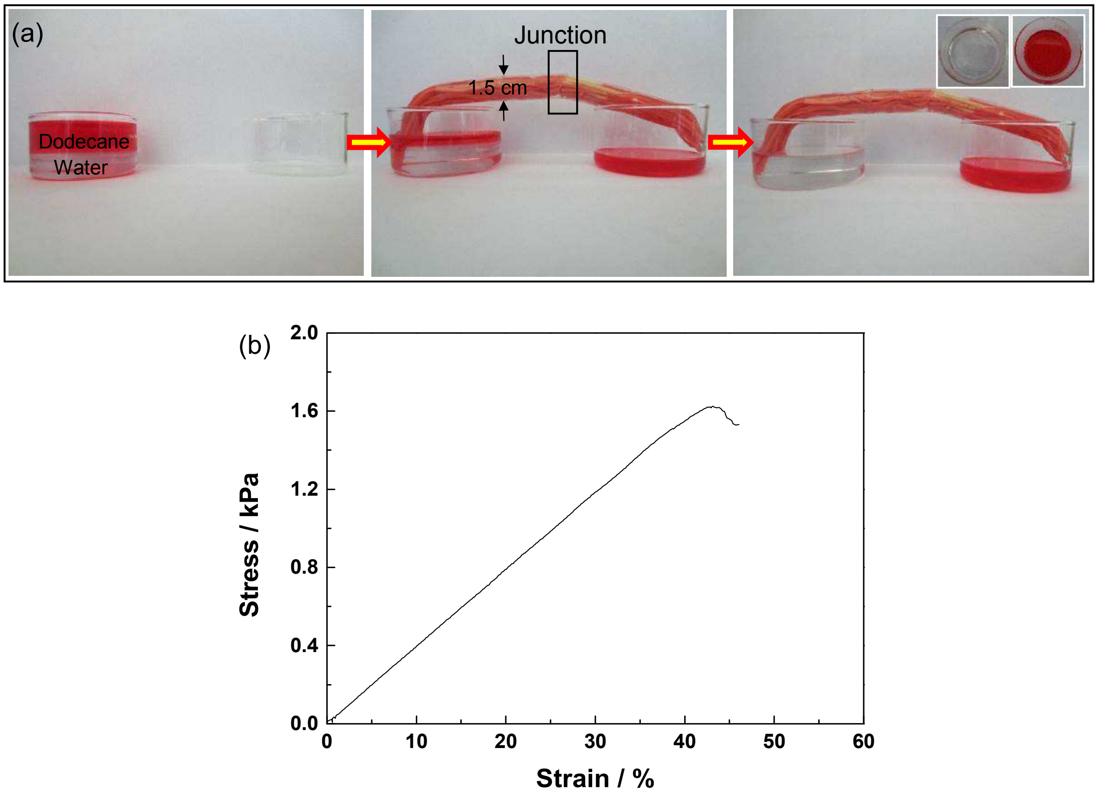


Figure S4. Climbing height of oils on juncus piths as a function of time.

Figure S4 is the climbing height of various oils on the pith as a function of time, which shows that the oils fast climbed along the pith in a few seconds and then they slowly reached their maximal height. The limit capillary height is associated with the density, viscosity, and surface tension of the oils. For example, toluene and chloroform have a height of 28 mm and 17 mm, respectively. On the contrary, the soybean oil only displays a value of 12.0 mm. Clearly, high density or viscosity will decrease the limit capillary height, while increasing surface tension is beneficial for a higher value. The separation can proceed automatically only the altitude of juncus pith to the surface of oil-water mixture is lower than its limit capillary height.



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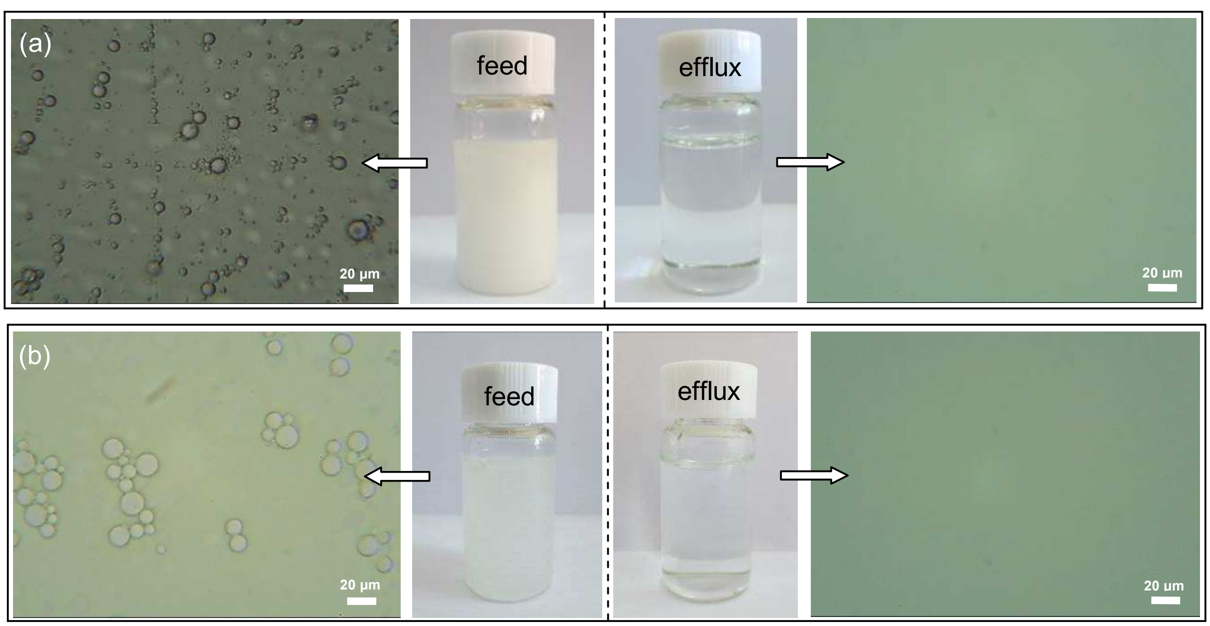

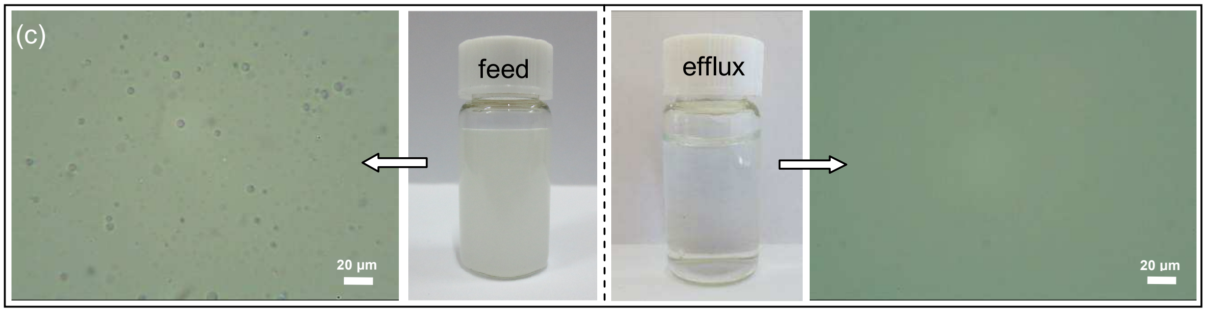

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Table S2. Water content of the oils collected from the water-in-oil emulsions.

Emulsions	W/T*	W/H	W/D	W/D (2 wt% water)
Water content of the collected oils / ppm	215.6	56.7	56.7	23.8

*Note that the original toluene contained ~255 ppm water. This means that most of the surfactant-stabilized water droplets, even including the original water in the toluene, were removed by the separation.

REFERENCES

(1) Della Greca, M.; Fiorentino, A.; Isidori, M.; Lavorgna, M.; Monaco, P.; Previtera, L.; Zarrelli, A. Phenanthrenoids from the Wetland *Juncus Acutus*. *Phytochemistry* **2002**, *60*, 633–638.