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In situ cross-linked superwetting nanofibrous membranes for ultrafast oil/water separation

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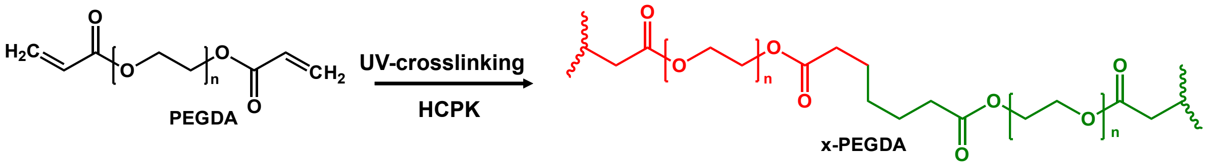

Scheme S1 UV crosslinking mechanism to convert PEGDA into x-PEGDA.

COD Measurements

2.5 mL of each testing sample was taken in COD vials. 1.5 mL of potassium dichromate (0.25 N) reagent, 3.5 mL of sulphuric acid, and pinch of mercuric sulphate and silver sulphate were added. The vials were closed tightly and were digested at 150^{o}C for 2 h and then were cooled to room temperature. These contents were transferred into the conical flask and 2-3 drops of ferroin indicator were added. And then titrated against freshly prepared ferrous ammonium sulphate (0.1 N). End point was the appearance of reddish brown colour. Distilled water blank was also run simultaneously. COD was calculated using following formula:

$$\mathrm{COD} = \frac{(A-B) \times N \times 8 \times 1000}{\text{Volume of sample taken}}$$

Where, A = volume of titrant used for the sample, B = volume of the titrant used for blank.

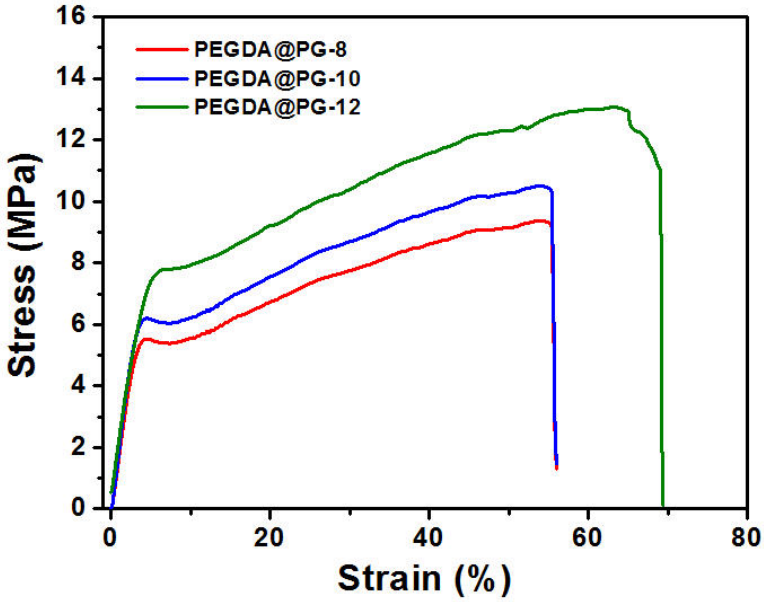

Fig. S1 Stress-strain curve for the relevant PEGDA@PG-8, PEGDA@PG-10, and PEGDA@PG-12 NF membranes.

In general, the mechanical properties of NF membranes depends on the intrinsic strength and the bonding among the fibers. Fig. S1 presented the typical tensile stress-strain curves for various NF membranes. PEGDA coated PG NF membranes (PEGDA@PG-8, PEGDA@PG-10, and PEGDA@PG-12 NF) exhibited bonding structure have shown a linear elastic behaviour in the first region under a stress load until reaching to the yield point, and then curves presented a nonlinear elastic behaviour until break due to the slip and "pull out" process of the individual PEGDA@PG fibers along the stress direction. The relevant membranes of PEGDA@PG-8, PEGDA@PG-10, and PEGDA@PG-12 NF possessed the tensile strength of 9.36, 10.50, and 13.06 MPa, respectively. Benefitting from the high tensile strength of intrinsic PEGDA@PG NF membranes, the PEGDA@PG-12 NF membrane showed a prominent tensile strength of 13.06 MPa, which is significantly higher than that of typical electrospun PAN nanofibrous membranes. After *in-situ* cross-linking, the x-PEGDA@PG-12 NF membranes showed robust strength of 9.58

MPa, which is attributed to the obvious decrease of breaking strain and increase of critical stress of forced orientation caused due to the strong adhesion among the nanofibers (Fig. S2).

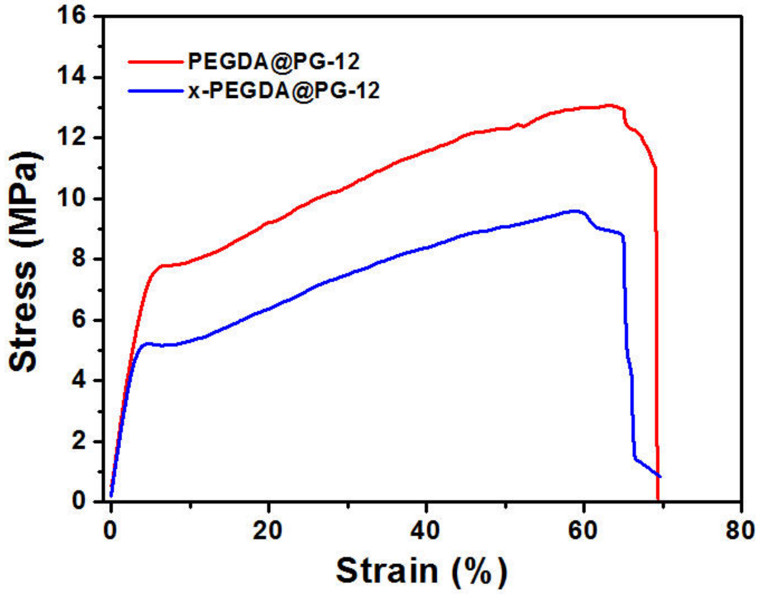

Fig. S2 Stress-strain curve for the relevant x-PEGDA@PG-12 and x-PEGDA@PG-12 NF membranes.

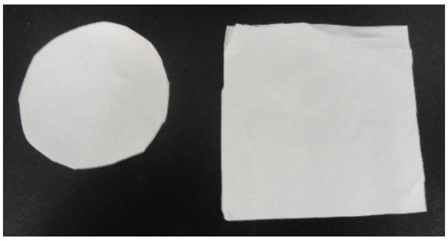

Fig. S3 Different shapes of x-PEGDA@PG-8 NF membranes.

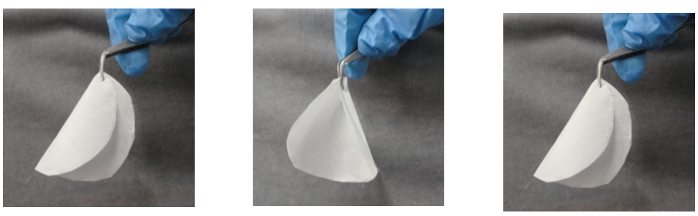

Fig. S4 The bending capability of x-PEGDA@PG-8 NF membranes.

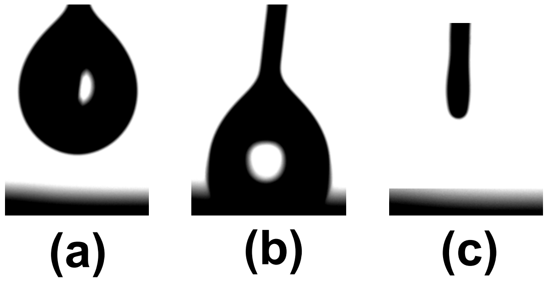

Fig. S5 Optical snapshots of dynamic contacting processes of oil droplets onto PAN-8 NF membrane.

Table S1 Pore size and the porosity of x-PEGDA@PG NF membranes obtained from the capillary flow porometer.

Samples	Maximum pore size μm	Mean flow pore size μm	Porosity %
x-PEGDA@PG-8	1.76	1.48	52.6
x-PEGDA@PG-10	2.62	2.01	48.7
x-PEGDA@PG-12	2.76	2.28	32.6