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# Hemocompatible MOF-decorated Pollen Hemoperfusion Absorbent for Rapid and Highly Efficient Removal of Protein-bound Uremic Toxins

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**Hemolysis and coagulation experiments**

For the hemolysis experiment, 0.5 mL of red blood cell suspension was diluted to 10 mL of PBS. 0.2 mL of the diluted red blood cell suspension was incubated with 0.8 mL of PPNU or PPNUH (10 mg) PBS solutions, respectively. PBS and water were served as negative and positive controls, respectively. After incubation for 2 h at room temperature, the mixtures were centrifuged at 344 *g* for 5 min to obtain the supernatant, which was further measured under the UV–vis spectroscopy at 541 nm. The hemolysis rate of the samples was calculated by the following equation:

$$H(\%) = \frac{A_s - A_n}{A_p - A_n} \times 100\%$$

wherein, $H$ is the sample hemolysis rate, $A_s$ is the absorbance value of the sample at 540 nm, $A_n$ is the absorbance value of the negative control at 540 nm, and $A_p$ is the absorbance value of the positive control at 540 nm.

In the coagulation experiment, freshly blood was centrifuged at 1200 *g* for 30 min at 4℃, and the supernatant was platelet-poor plasma. 10 mg of samples and 2 mL of $CaCl_2$ solution were added to 3 mL of platelet-poor plasma and incubated at 37℃ for 2 h. The activated partial thromboplastin time (APTT) and thromboplastin time (TT) of the supernatant were characterized at Second Hospital of Dalian Medical University for determination of the anticoagulant properties of the sample.

**PCS and QA concentration measurement by HPLC**

For PCS, the mobile phase consisted of acetonitrile (A) and sodium acetate (10 mmol $L^{-1}$) buffer (B pH 4.0) was mixed gradually from 17.5% A:82.5% B to 45% A:55% B within 8 min at 25℃, the flow rate was set as 1 mL $min^{-1}$ using a C18 column. The detection wavelength of the UV detector was set as 264 nm.

For QA, 150 μL of QA supernatant was mixed with 450 μL of anhydrous methanol. Specifically, the mobile phase composed of methanol and 0.1% tetrabutylammonium hydroxide phosphate solution (pH = 7) was mixed in a 1:1 volume ratio in the C18 column at 30℃. The flow rate was 0.9 mL $min^{-1}$, and the detection wavelength of the UV detector was set as 242 nm. The equilibrium adsorption capacity $q_e$ is calculated by the following equation:

$$q_e = \frac{(c_0 - c_e) \times V}{m}$$

wherein, $c_0$ is the initial concentration, $c_e$ is the concentration of toxin obtained after adsorption at a specific concentration, $V$ is the volume of the adsorption system, and m is the mass of the adsorbent.

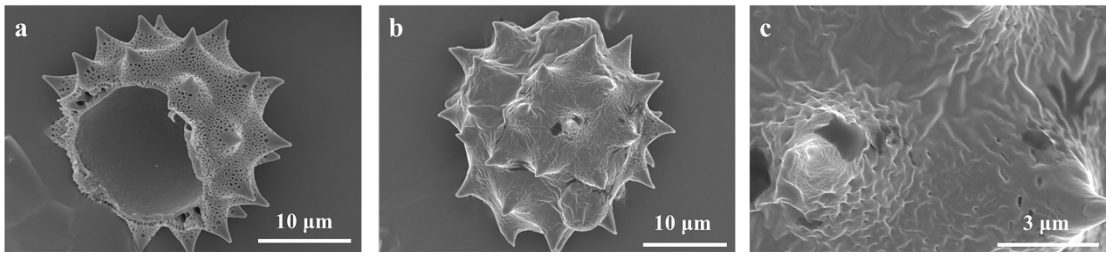


**Figure S1** a) Typical SEM image of hollow microsphere structure of pretreated pollen (Pol). b, c) Typical SEM images of natural untreated pollen.

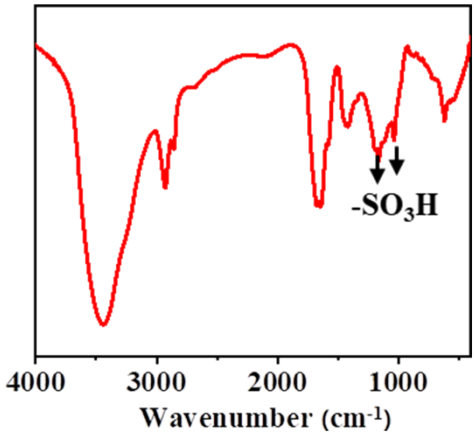


**Figure S2** Fourier transform infrared spectroscopy (FITR) of Pol. The peaks emerging at 1036 $cm^{-1}$ and 1167$cm^{-1}$ (indicating arrows) are characteristic peaks of sulfonic acid group[1].

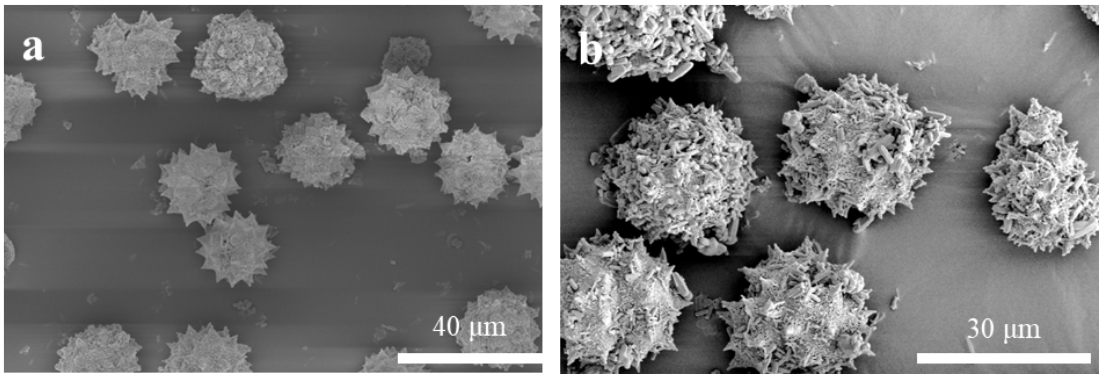


**Figure S3** a) Typical SEM image of PPNUH. b) Typical SEM image of PPNUH after 24-h incubation of PPNUH in PCS solution.

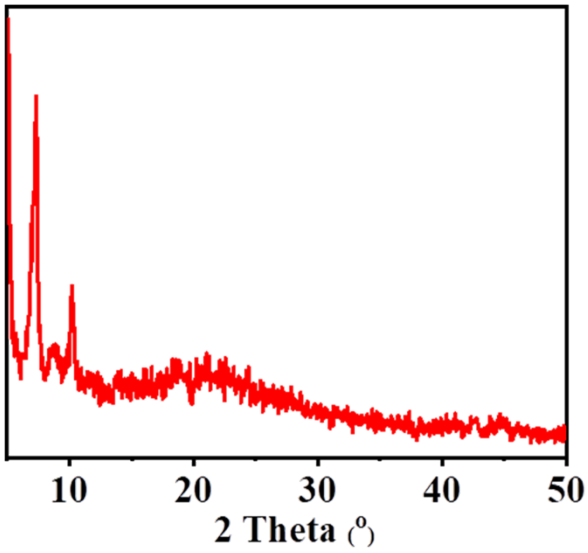


**Figure S4** X-ray diffraction (XRD) curve of PPNUH.

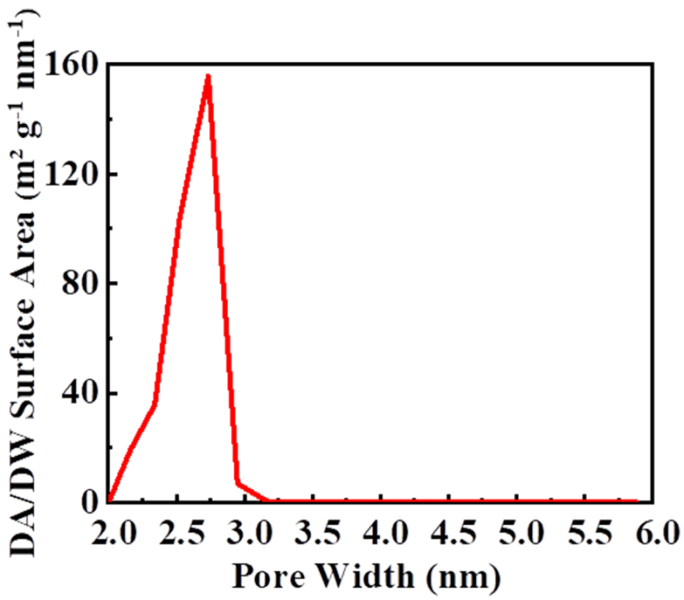


**Figure S5** The pore size distribution of PPNUH.

References:

[1] V. S. Rangasamy, S. Thayumanasundaram, J. W. Seo and J. P. Locquet, Vibrational spectroscopic study of pure and silica-doped sulfonated poly(ether ether ketone) membranes, *Spectroc. Acta Pt. A-Molec. Biomolec. Spectr.*, 2015, 138, 693-699.