Supporting Information

Some other SEM images were shown in figure S1. The figure S1 (a) suggests that PmPD dissolved in DMSO can form PmPD band with the evaporation of DMSO, figure S1 (b) exhibits morphology of PVA. The PmPD/PVA membranes have many pits, and the pits of $PmPD_{0.4}/PVA_{0.6}$ membrane aren't uniform as the other two membranes. It means that the structure of membrane may change, when the content of PmPD over 40%. The macroscopic feature of PmPD/PVA membrane was shown in figure S2 (a), a black thin membrane. As show in figure S2 (2), the membrane was complete and intact after folding in 180°. It indicates that the PmPD/PVA membrane has flexibility and good mechanical property. The good flexibility and mechanical property are important in practical application. The surface roughnesses of PmPD/PVA membranes were characterized by an AFM. The AFM images were shown in figure S3. The roughnesses of $PmPD_{0.2}/PVA_{0.8}$ membrane, $PmPD_{0.3}/PVA_{0.7}$ membrane and $PmPD_{0.4}/PVA_{0.6}$ membrane were 34.9 nm, 36.6 nm and 30.1 nm respectively. There are not much difference of surface roughnesses between the three PmPD/PVA membranes. The high value of the surface roughness is very beneficial in adsorption process.

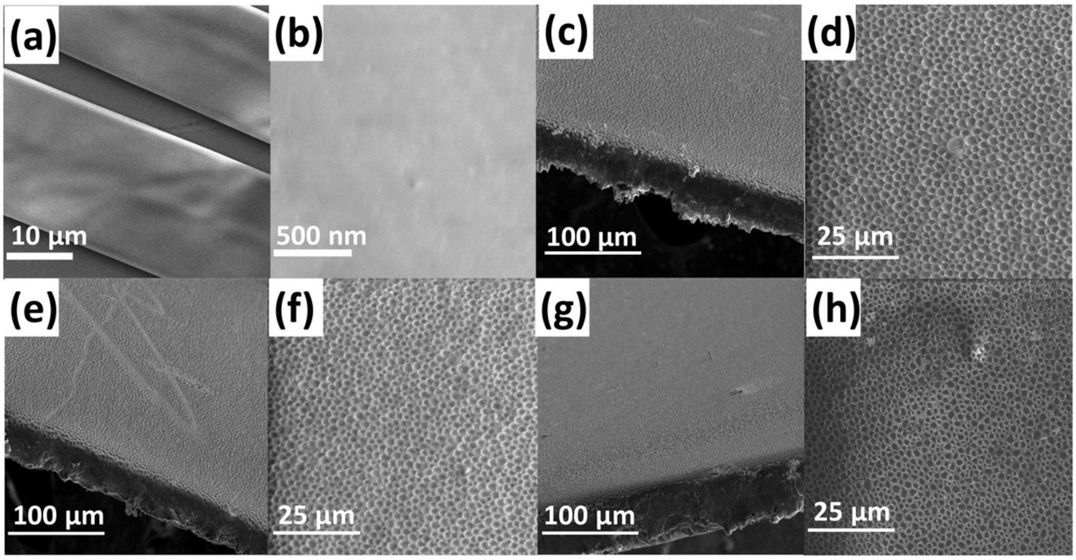

Figure S1. SEM images (a) of PmPD dissolved in DMSO, (b) of PVA membrane (c) and (d) of $PmPD_{0.2}/PVA_{0.8}$ membrane, (e) and (f) of $PmPD_{0.3}/PVA_{0.7}$ membrane, (g) and (h) of $PmPD_{0.4}/PVA_{0.6}$ membrane.

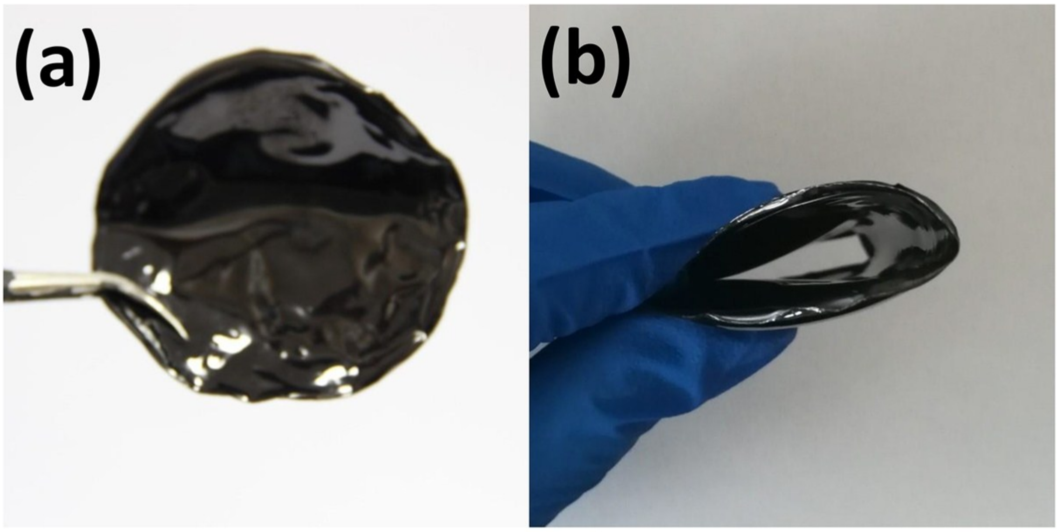

Figure S2. (a) The physical photo of PmPD/PVA membrane and (b) folding in 180° of the membrane.

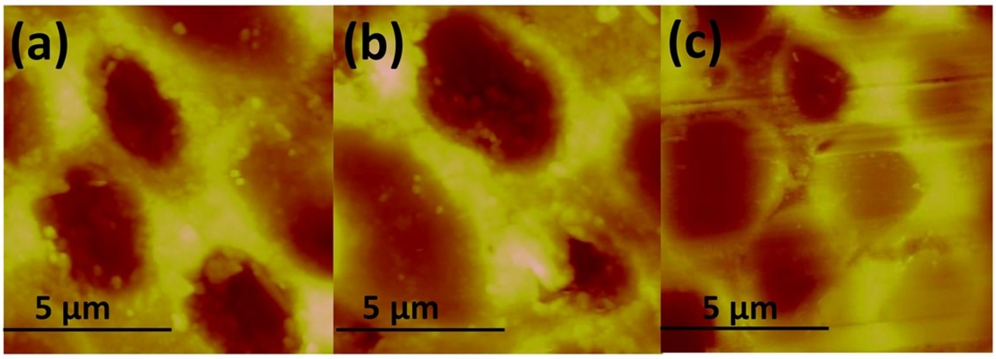

Figure S3. AFM images (a) of $PmPD_{0.2}/PVA_{0.8}$ membrane, (b) $PmPD_{0.3}/PVA_{0.7}$ membrane and (c) of $PmPD_{0.4}/PVA_{0.6}$ membrane.

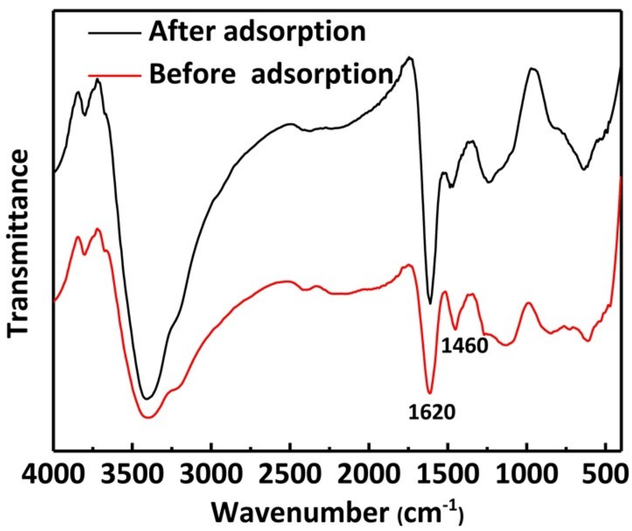

Figure S4. FT-IR spectra of PmPD before and after Cr(VI) adsorption.

The uv-vis absorption spectrum of Cr(VI) solution was shown in figure S5, Cr(VI) ions and 1,5-diphenyl carbazide formed a purple complex in the solution. Accordingly, there has a peak at 542 nm. The concentration of Cr(VI) was calculated from the absorbance at 542 nm. Moreover, the peak at 542 nm will disappear when the Cr(VI) ions were cleaned up after adsorption of PmPD/PVA membrane. The uv-vis absorption spectrum of Cr(VI) solution in five cycle times of $PmPD_{0.4}/PVA_{0.6}$ membrane was shown in figure S6. The absorbance at 542 nm was almost 0 after adsorption in the first time, and the absorbance at 542 nm after adsorption enhance with the cycle time increases. But the absorbance after adsorption in the fifth time was still low compared with the absorbance before adsorption. It indicates that the PmPD/PVA membranes have great reusability for removal of Cr(VI).

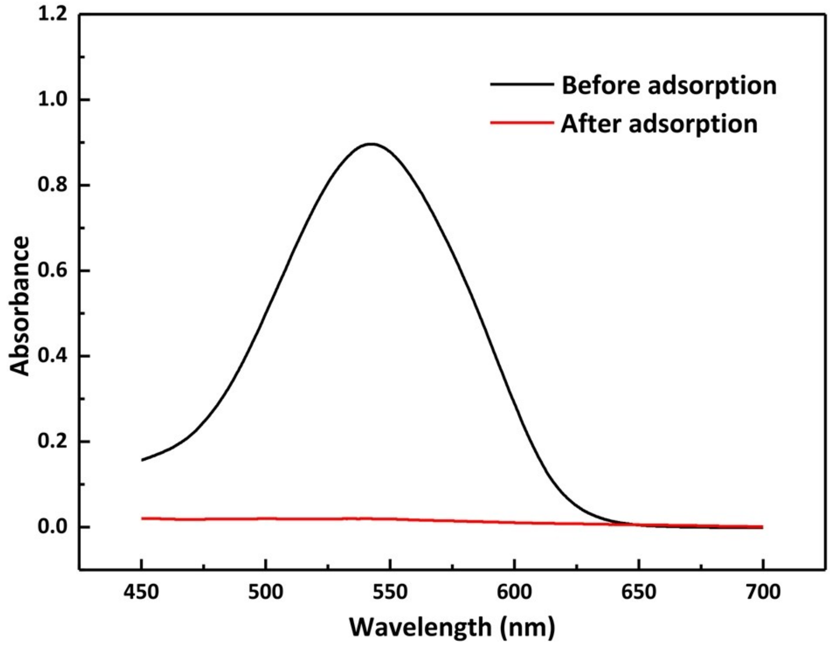

Figure S5. UV-vis absorption spectrum of Cr(VI) solution.

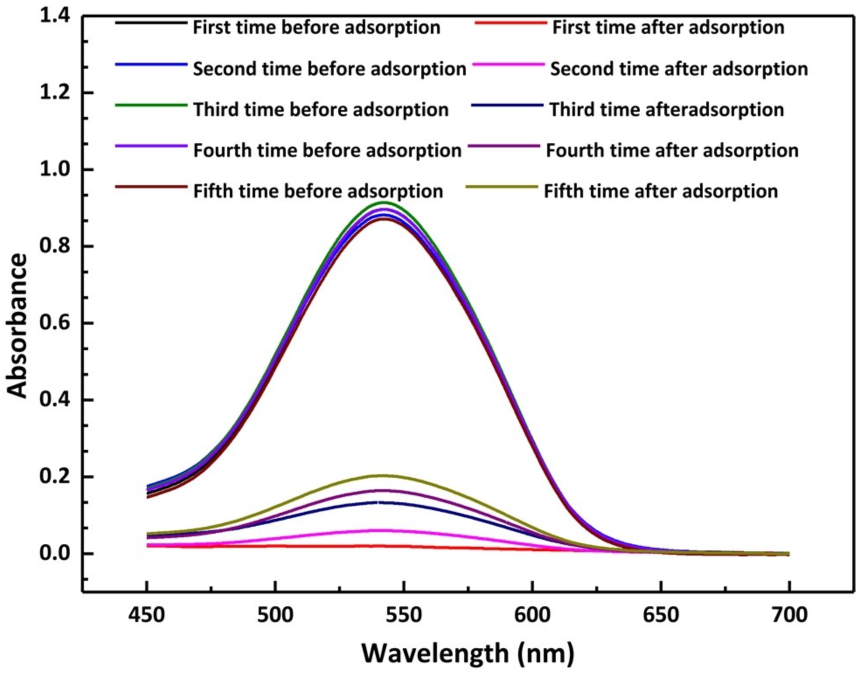

Figure S6. UV-vis absorption spectra of Cr(VI) solution in five cycle times.

As present in figure S7, the yellow Cr(VI) solution change clean through twice dead end filtration, which suggests the PmPD/PVA membrane is feasible in technology for using in water purification.

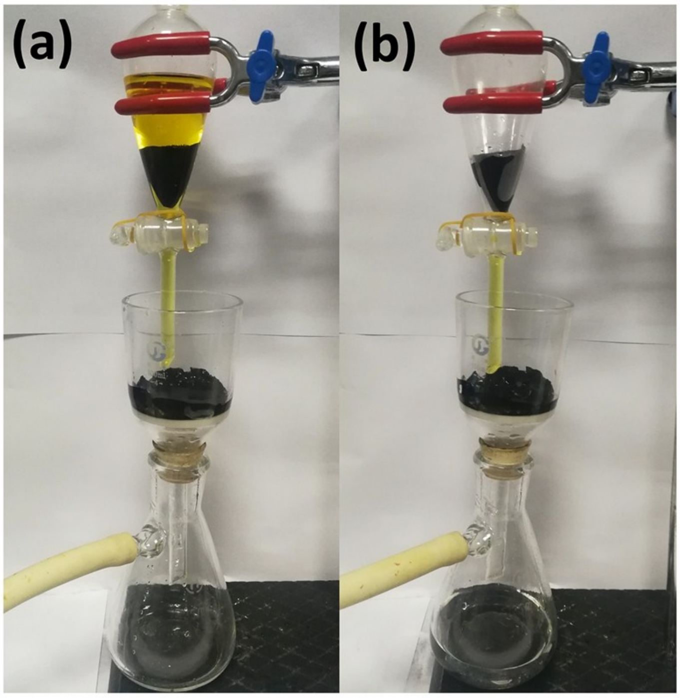

Figure S7. Simple dead end filtration system for Cr(VI) removal (temperature, 25 °C; volume of the solution, 50 mL; Cr(VI) mass concentration, 300mg/L; pH, 2.0).