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Mussel-inspired self-coating at macro-interface with improved biocompatibility and bioactivity via dopamine grafted heparin-like polymer and heparin

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Supporting Information

Preparation of PES membranes

The homemade PES membranes used in this study were prepared by a phase inversion technique. 16 wt. % PES was dissolved into N, N-Dimethylacetamide (DMAc) solvent and then with vigorous stirring until clear homogeneous solutions was obtained. After vacuum degassing, the casting solutions were prepared into membranes by spin coating coupled with a liquid–liquid phase separation technique at room temperature. The membranes were rinsed with de-ionized water thoroughly to remove the residual solvent, which were confirmed by the UV scanning. The membranes were dried overnight in a refrigerant vacuum-desiccator, and the

membranes were in a uniform thickness of about 50 μm.

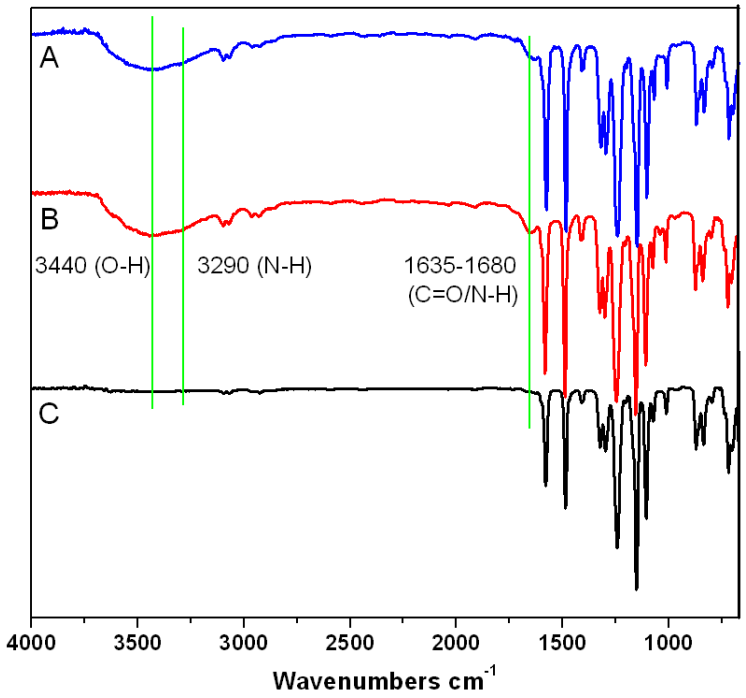

Fig. S1 ATR-FTIR spectra for DA-Hep/PES (A), DA-HepLP/PES (B) and PES membrane (C).

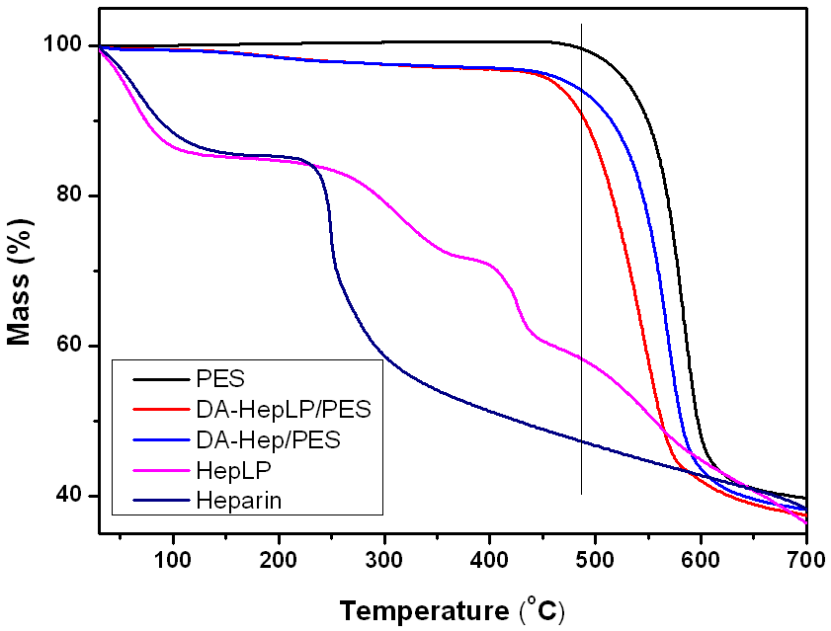

Fig. S2 TGA curves for PES, DA-HepLP/PES, DA-Hep/PES, HepLP and heparin at a nitrogen atmosphere.

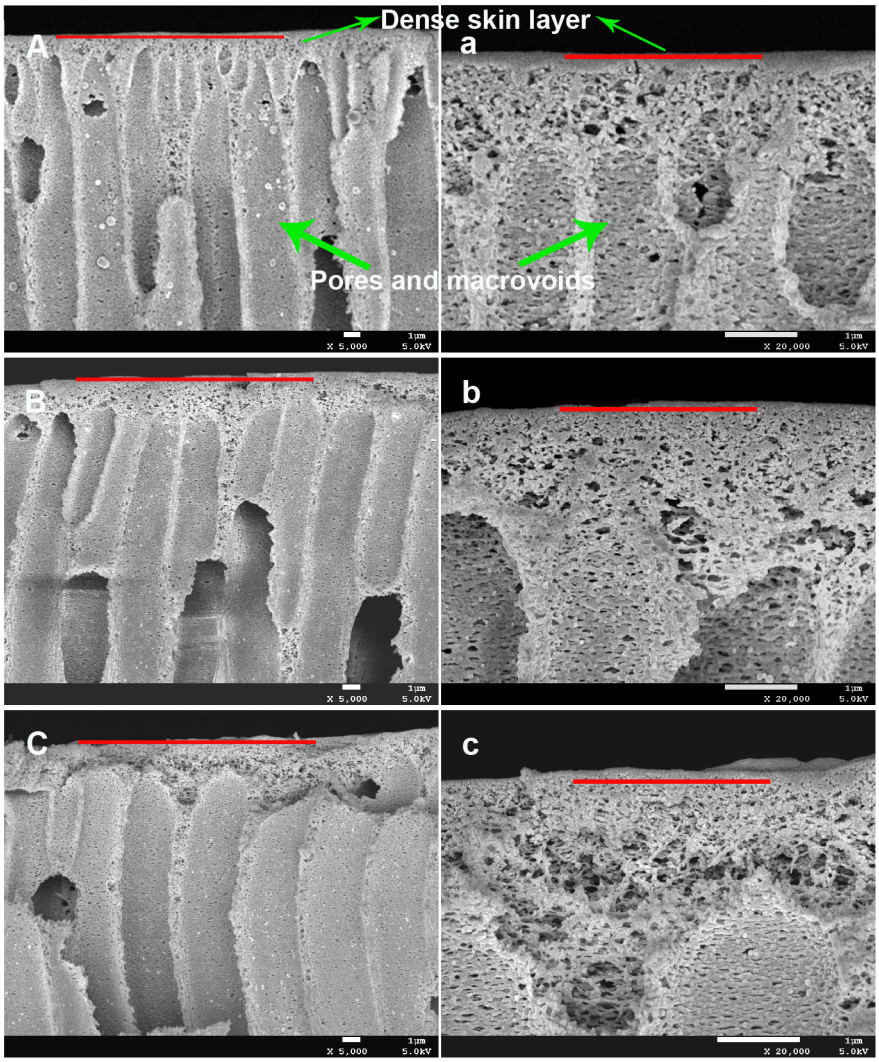

Fig. S3. SEM images of the general cross-section views of PES and the surface coated membranes. PES (A and a), DA-HepLP/PES (B and b, 48 h), DA-Hep/PES (C and c, 48 h), Magnification: ×5000 and ×20000.

As shown in the figure, no visible coated polymer layers are observed. The macromolecules, DA-g-HepLP and DA-g-Hep, are very difficult to permeate into the inside of the membrane due to the surface dense skin layers with invisible nano-pores (usually < 2-4 nm).

The coated thickness on the top surface might be estimated to be more than 100 nm with a 48 h coating time.

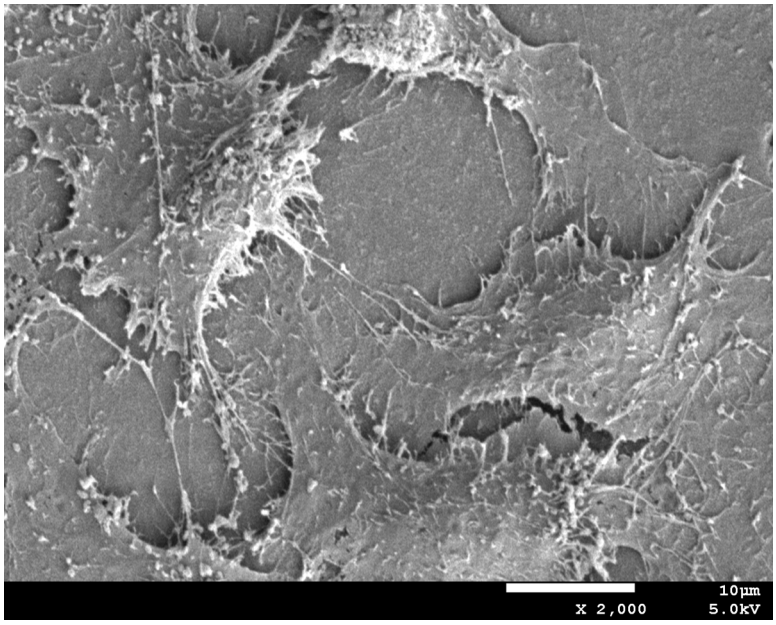

Fig. S4. Morphology of the HUVECs of the control group observed by SEM. To facilitate the sample collection and observation, the commercial polystyrene thin sheets, the same materials and compositions as polystyrene cell culture plate, were used. The culture condition was the same as the heparin-mimicking surfaces, culture time: 5 days.

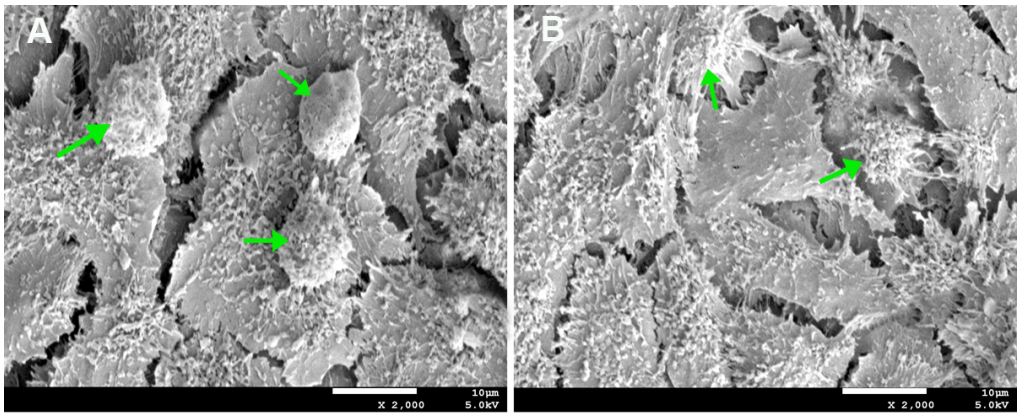

Fig. S5. Morphologies of the HUVECs observed by SEM. The membranes: DA-HepLP/PES (A) and DA-Hep/PES (B) membranes; the cell culture time is 7 days.

The spheroids of HUVECs were pointed by the green arrowhead.