# Supporting information

# Chlorogenic acid functional strategy of anti-inflammation, anti-coagulation and promoted endothelial proliferation for bioprosthetic artificial heart valves

Xiaotong Chen[ab], Tao Yu[b], Qunshou Kong[b], Hong Xu[b], Zhiyu Zhao[b], Haojun Fan[a], Yunbing Wang[b], Gaocan Li[b*]

[a]National Engineering Research Center of Clean Technology in Leather Industry, Sichuan University, Chengdu 610065, China.

[b]National Engineering Research Center for Biomaterials, Sichuan University, Chengdu 610065, China.

*Corresponding authors.

E-mail addresses: gaocanli@scu.edu.cn (G. Li)

**Synthesis of OX-OH and OX-CO**

OX-OH and OX-CO were synthesized according to the reported literature. Briefly, trimethylaminomethane (36.00 g, 0.297 mol) and paraformaldehyde (20.52 g, 0.684 mol) were dissolved in toluene (300 mL) in a 500 mL three-mouth flask and heated to reflux for 8 h. After the reaction, toluene was removed by rotary evaporation and the crude compound was recrystallized with ice ethyl acetate. The target product OX-OH was obtained as a white solid (37.00 g, 86 %). $^1$H NMR (400 MHz, $CDCl_3$) δ = 4.46

(dd, *J*=19.0, 5.5, 4H), 3.78 (q, *J*=8.8, 4H), 3.59 (d, *J*=13.5, 2H), 2.93 (s, 1H).

Hydroxymethyl oxazolidine (OX-OH) (48.00 g, 0.331 mol) and succinic anhydride (36.2 g, 0.360 mol) were dissolved in dry tetrahydrofuran (200 mL). After refluxing at 130 °C for 8 hours, the white crystal was obtained by rotary evaporation and purified by recrystallization as the same method above. The product OX-CO was successfully prepared (55.00 g, 60.92%). $^1$H NMR (400 MHz, $CDCl_3$) δ = 7.27 (s, 11H), 4.55 – 4.33 (m, 59H), 4.19 (s, 26H), 3.89 – 3.74 (m, 58H), 3.62 (s, 2H), 3.22 (s, 1H), 2.77 – 2.49 (m, 57H), -0.00 (s, 7H).

The OX-OH and OX-CO were successfully synthesized according to NMR spectroscopy (Fig. S1).

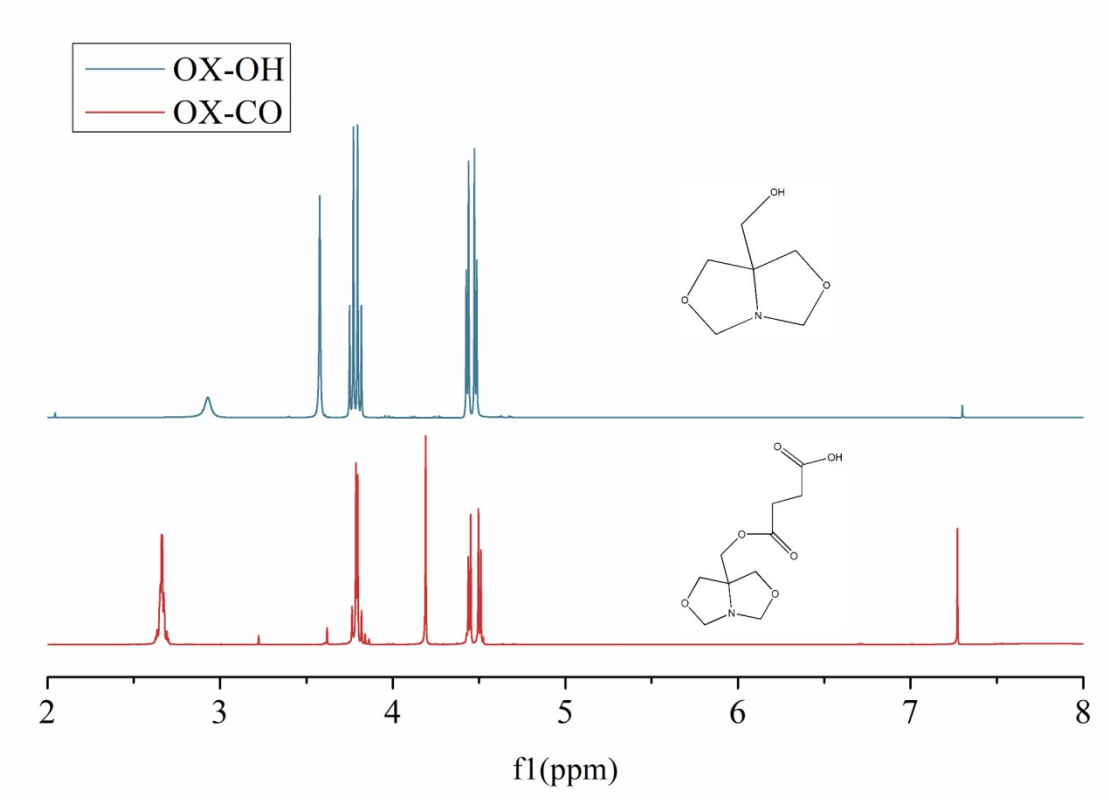



**Figure S1.** $^1$H NMR of OX-OH and OX-CO.

**Conversion of amine group**

The G-PP, OX-CO-PP, OX-PB-PP and OX-CA-PP (1 cm × 1 cm) were weighed and recorded after freeze-drying. D-PP was set as control. Each sample was incubated with 2 ml ninhydrin solution (1% W/V, pH=5) at 95 °C for 2 hours. The absorbance of supernatant fluid was measured by using microplate reader at 567 nm. The conversion of amine group was calculated according to the following formula:

$$Conversion\ of\ amine\ group = \left(1 - \frac{OD_{sample}/W_{sample}}{OD_{D-PP}/W_{D-PP}}\right) \times 100\%$$

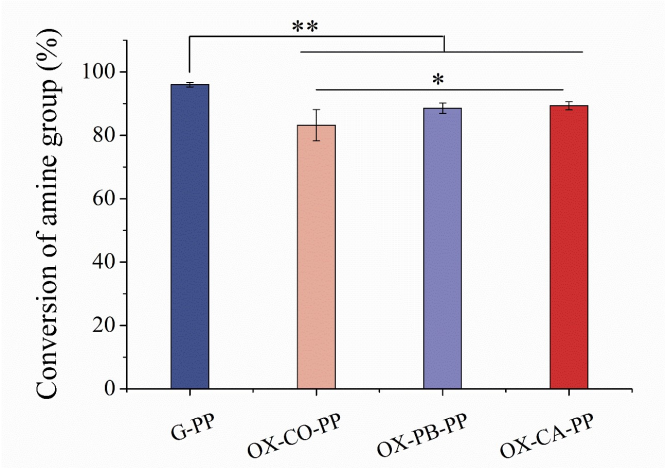



**Figure S2.** Conversion of amine group determined by ninhydrin assay. (n = 5)

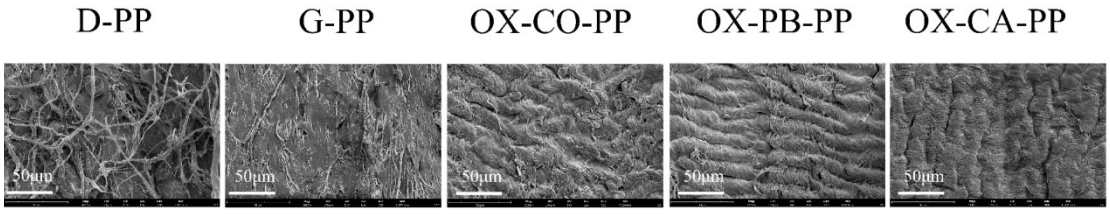



**Figure S3.** Micromorphology of PPs by SEM. (bar = 50 μm)

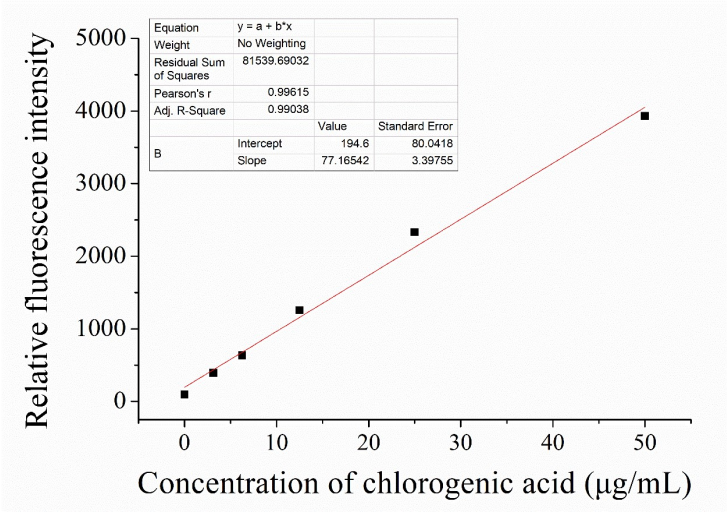



**Figure S4.** Standard curve of chlorogenic acid in PBS solution.

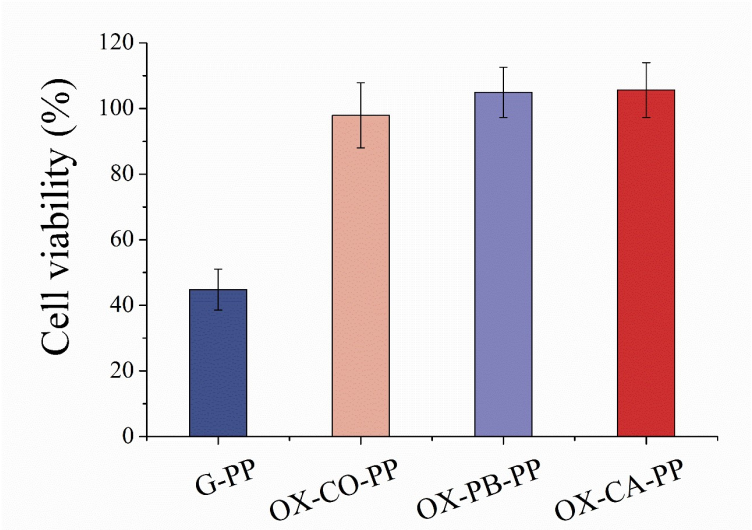
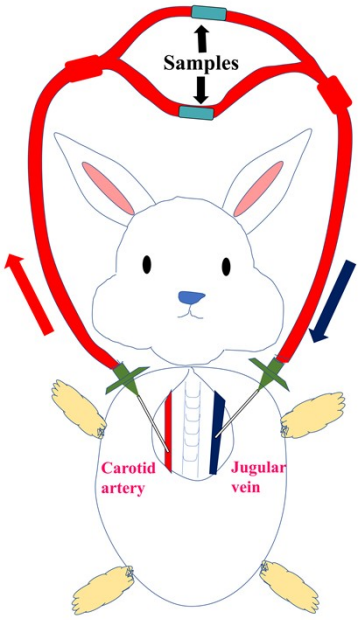



**Figure S5.** RAW 264.7 cell viability after incubation with the extraction of PPs for 24 h (n = 6).

## Arteriovenous shunt assay




Scheme S1. Schematic diagram of arteriovenous shunt assay.