

# Gold Nanoparticles with Antibiotic-Metallopolymers toward Broad-Spectrum Antibacterial Effect

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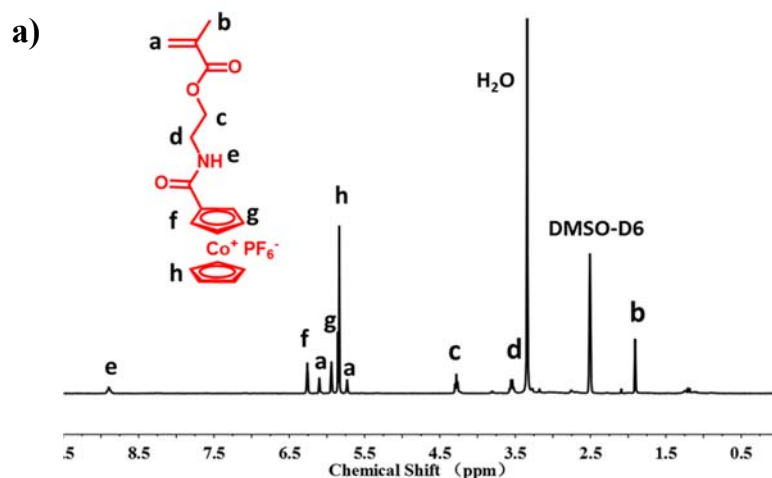
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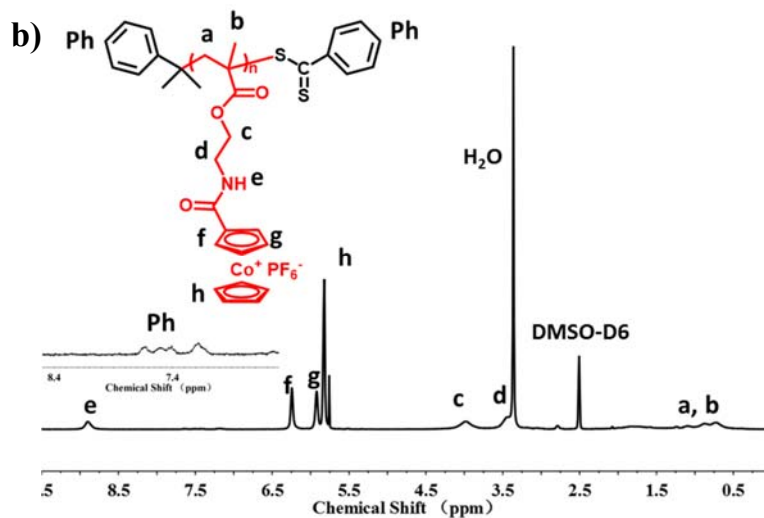
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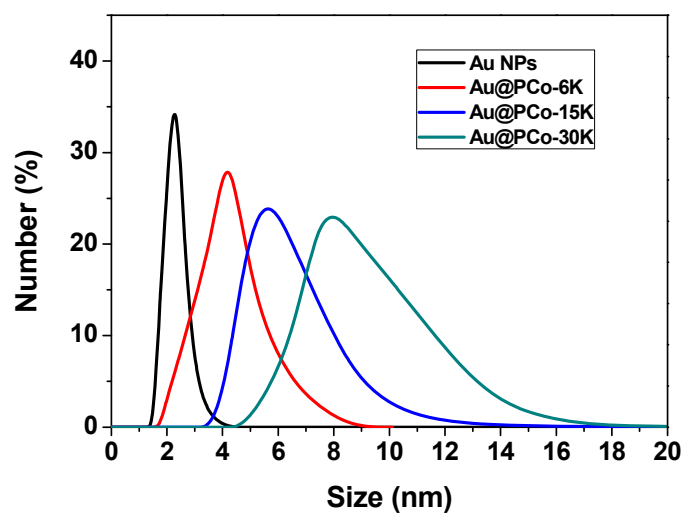
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## Supplementary Information





**Figure S1.**  $^1\text{H}$  NMR spectra of (a) cobaltocenium monomer CoAEMA and (b) cobaltocenium polymer PCoAEMA via RAFT polymerization.



**Figure S2.** Size distribution of Au NPs, and Au@PCo NPs with different cobaltocenium polymer molecular weights tested by DLS.

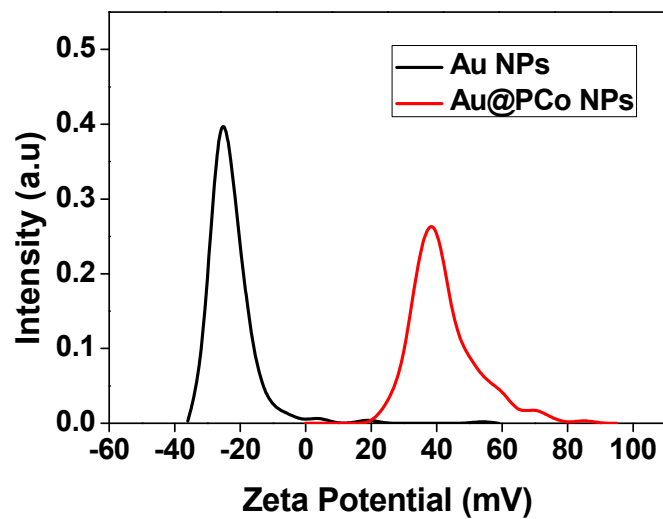


Figure S3. Zeta potential data of Au NPs and Au@PCo NPs.

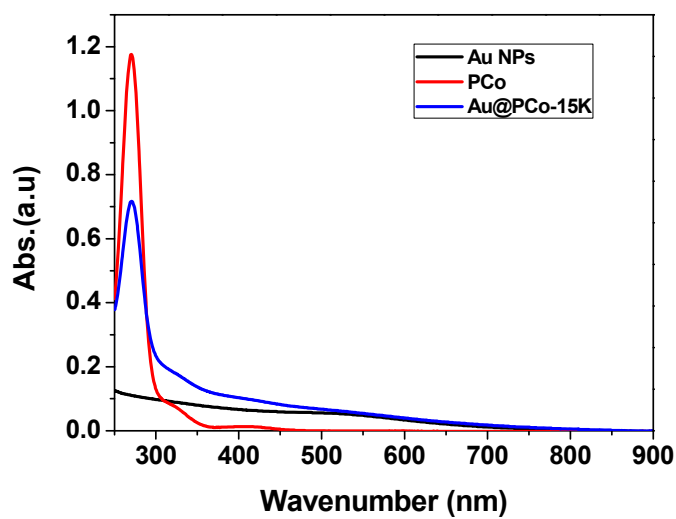
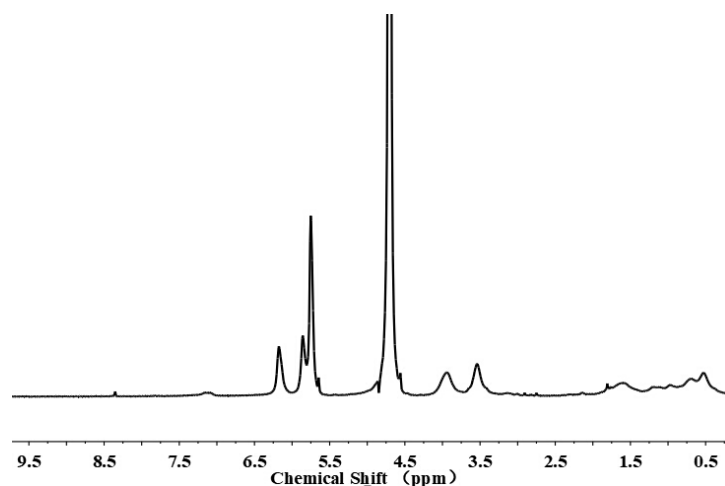
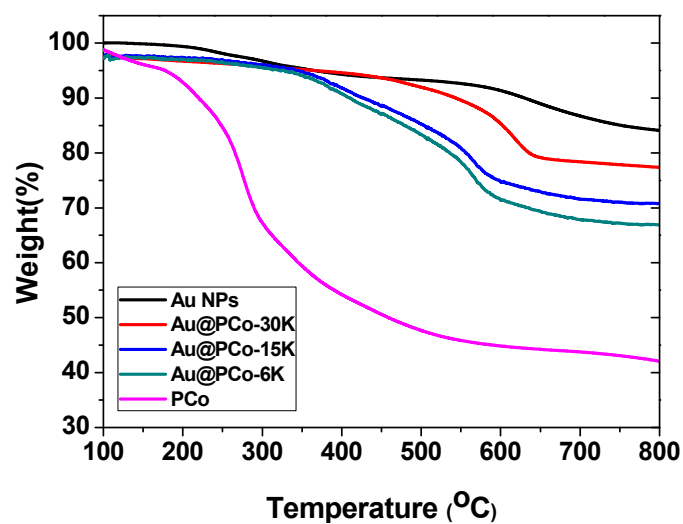


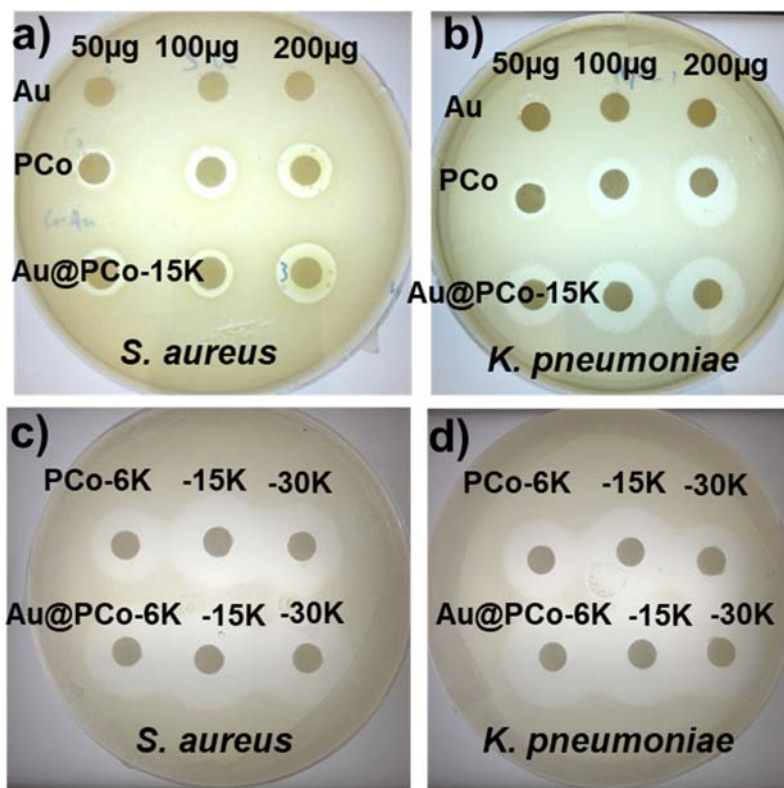
Figure S4. UV-vis absorption spectra of Au NPs, PCo homopolymers and Au@PCo NPs.



**Figure S5.**  $^1\text{H}$  NMR spectrum of Au@PCo NPs in  $\text{D}_2\text{O}$ .



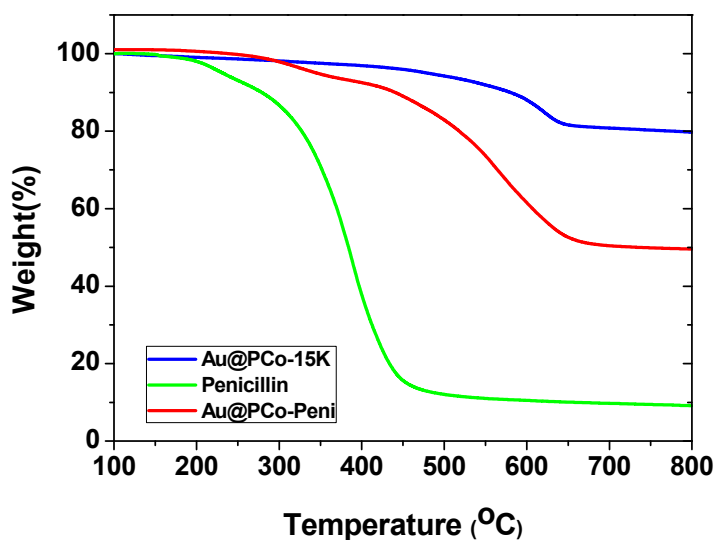
**Figure S6.** TGA data of Au NPs, PCo homopolymers and Au@PCo NPs with different cobaltocenium polymer molecular weights.



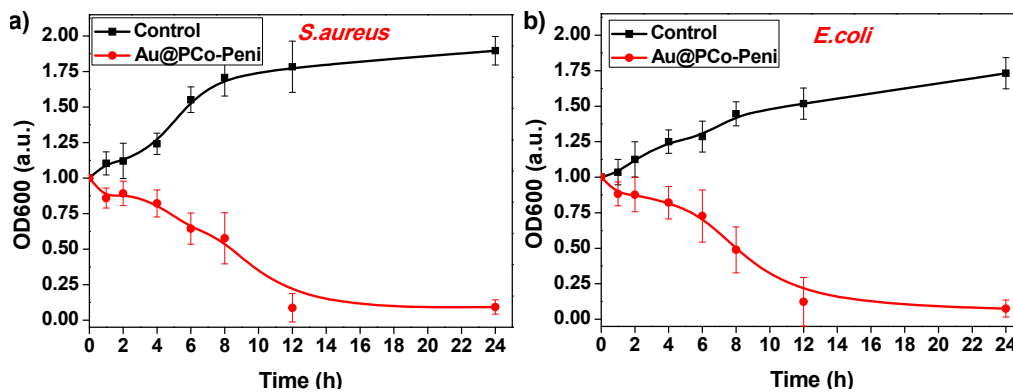
**Figure S7.** Antimicrobial effect of Au NPs, PCo homopolymers and Au@PCo NPs with different molecular weight of cobaltocenium polymers against Gram-positive bacteria using disk-diffusion assays. All compounds with different amount (50,100 and 200 µg for a) and b); 300 µg for c) and d) in 30 µL water (DMSO for Au NPs) was added to disks, and the plates were incubated at 28 °C for 18 h.

**Table S1.** The Minimum Inhibitory Concentrations of different cationic cobaltocenium polymers and Au@PCo NPs against Gram-positive and Gram-negative strains.

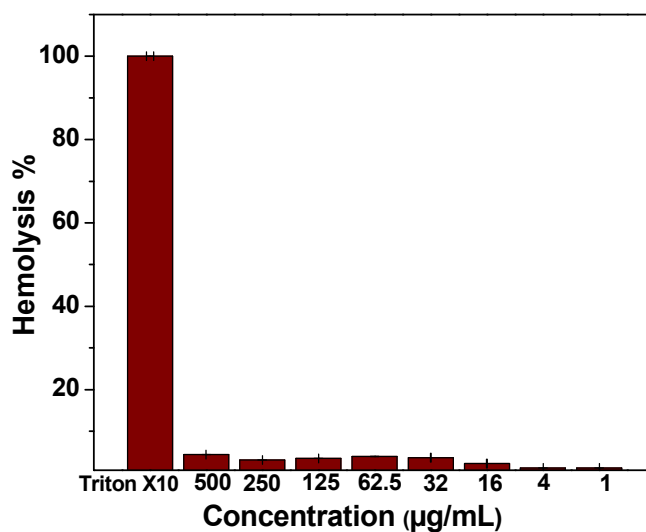
Bacteria	Minimum Inhibitory Concentration (MIC, $\mu\text{g/mL}$ )					
	PCo- 6K	PCo- 15K	PCo- 30K	Au@PCo- 6K	Au@PCo- 15K	Au@PCo- 30K
<i>S. aureus</i>	136	100	121	95	54	76
<i>K. pneumonia</i>	125	87	120	53	49	61



**Figure S8.** TGA data of Au@PCo-15K NPs, penicillin-G and Au@PCo-Peni.



**Figure S9.** Time-kill curves of Au@PCo-Peni NPs against *S. aureus* and *E. coli*. Bactericidal activities were monitored for 24 h. The bacterial TSB solution without conjugates was used as the control.



**Figure S10.** The toxicity test of Au@PCo-15K NPs at different concentrations on red blood cells (RBCs) by evaluating whether they could lead to hemolysis of RBCs.