Supporting Information

Effect of Branched Architecture on Antibacterial Activity of Poly(sulfone amine)s and Poly(sulfone amine)/Silver Nanocomposites

Ruibin Wang,[a, c] Li Wang,[b] Linzhu Zhou,[a] Yue Su,[a] Feng Qiu,[a] Dali Wang,[a] Jieli Wu,[c] Xinyuan Zhu,[*a, c] and Deyue Yan[*a]

[a] School of Chemistry and Chemical Engineering, State Key Laboratory of Metal Matrix Composites, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, P. R. China

[b] Key Laboratory of Ion Beam Bioengineering, Chinese Academy of Sciences, P. O. Box 1126, Hefei, Anhui 230031, P. R. China

[c] Instrumental Analysis Center, Shanghai Jiao Tong University, 800 Dongchuan Road, Shanghai 200240, P. R. China

* To whom correspondence should be addressed. xyzhu@sjtu.edu.cn; dyyan@sjtu.edu.cn. Tel.: +86-21-34205699. Fax: +86-21-34205722.

The zone of inhibition of PSA/Ag nanocomposites

The antibacterial abilities of all PSA/Ag nanocomposites were examined by the standard disk diffusion assay on Potato Dextrose Agar (PDA) medium (PDA medium: potato 200 g, glucose 20 g, agar 15-20 g, tap water 1 L, natural pH). In these tests, *Aspergillus niger* was used as model bacteria. Disks of 6 mm diameter were used in all bactericidal activity tests. These disks were aseptically applied to the surface of agar plates having 200 μL of *Aspergillus niger* (24 h culture, 10^6 CFU/mL) spread uniformly. The plates were incubated at 28 °C for 24 h, and the zones of inhibition were measured. All disks with PSA/Ag nanocomposites showed that the width of zones of inhibition increased from 2.0 to 2.3 cm with the polymer DB from 0.04 to 0.40. The average zones of inhibition of the control disks were 0.68 cm.

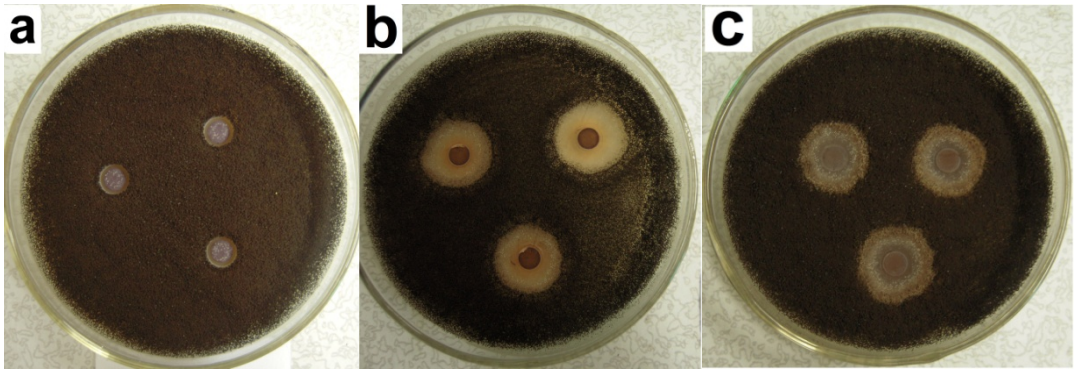

Fig. S1. Visual images of zone of inhibition of (a) control, (b) PSA1/Ag nanocomposites, (c) PSA5/Ag nanocomposites.

The the original high-resolution TEM image of a single AgNP in Fig.5(f)

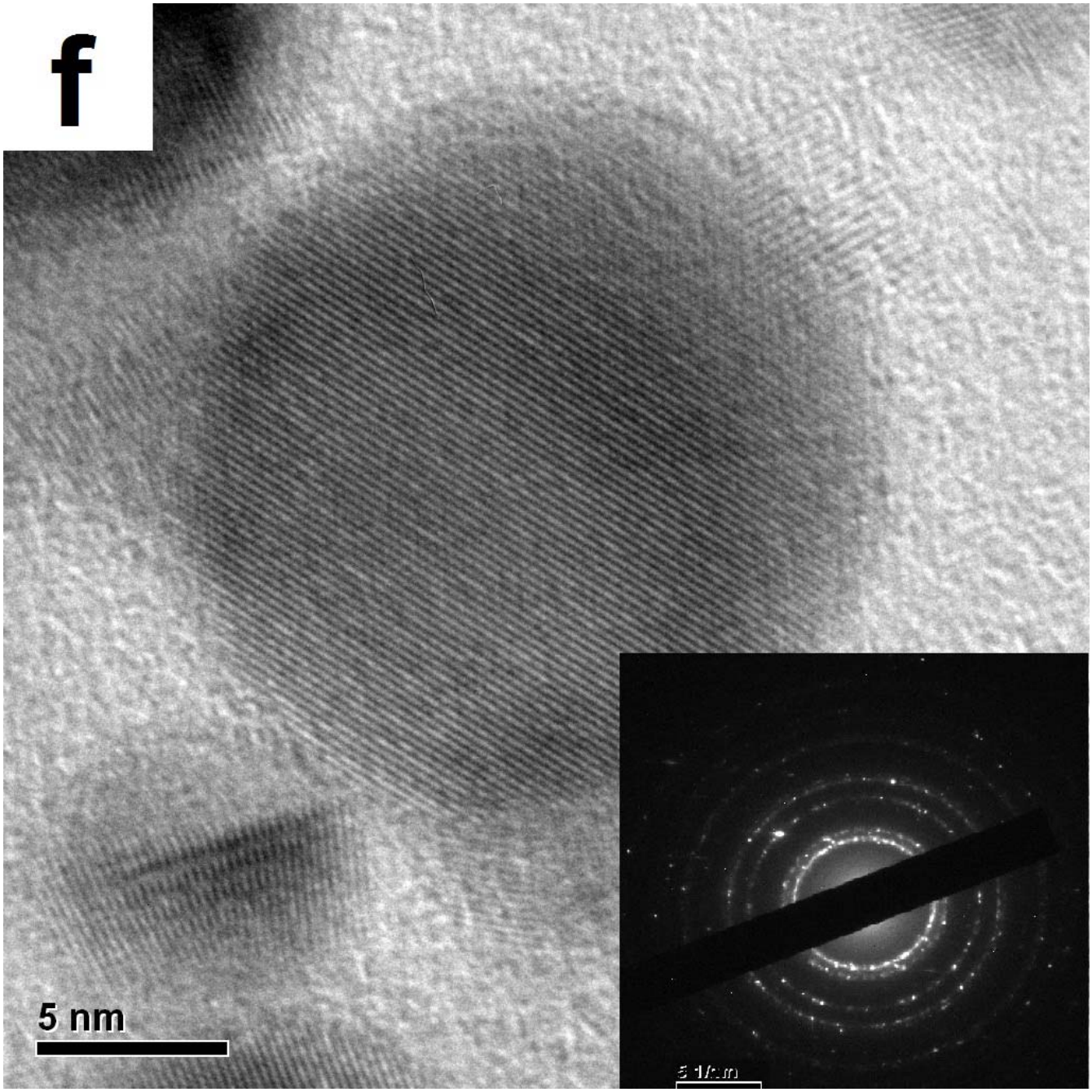

Fig. S2. The the original high-resolution TEM image of a single AgNP in Fig.5(f).

Detection method for the complete reduction of Ag^+ to Ag^0

Typically, after reacting for a certain period of time, 5 mL of colloidal solution was centrifuged (5000 r/min for 10 min) and the clear upper solution was collected. Then, Na_2S aqueous solution (0.1 mmol/mL) was dropped into it. If no Ag_2S precipitates were observed, it was convinced that there was no remaining Ag^+ in the reaction solution any more. After reacting for 12 h, no Ag_2S precipitates were observed any more for all the samples.

The GPC trace of the synthesized linear and branched PSA

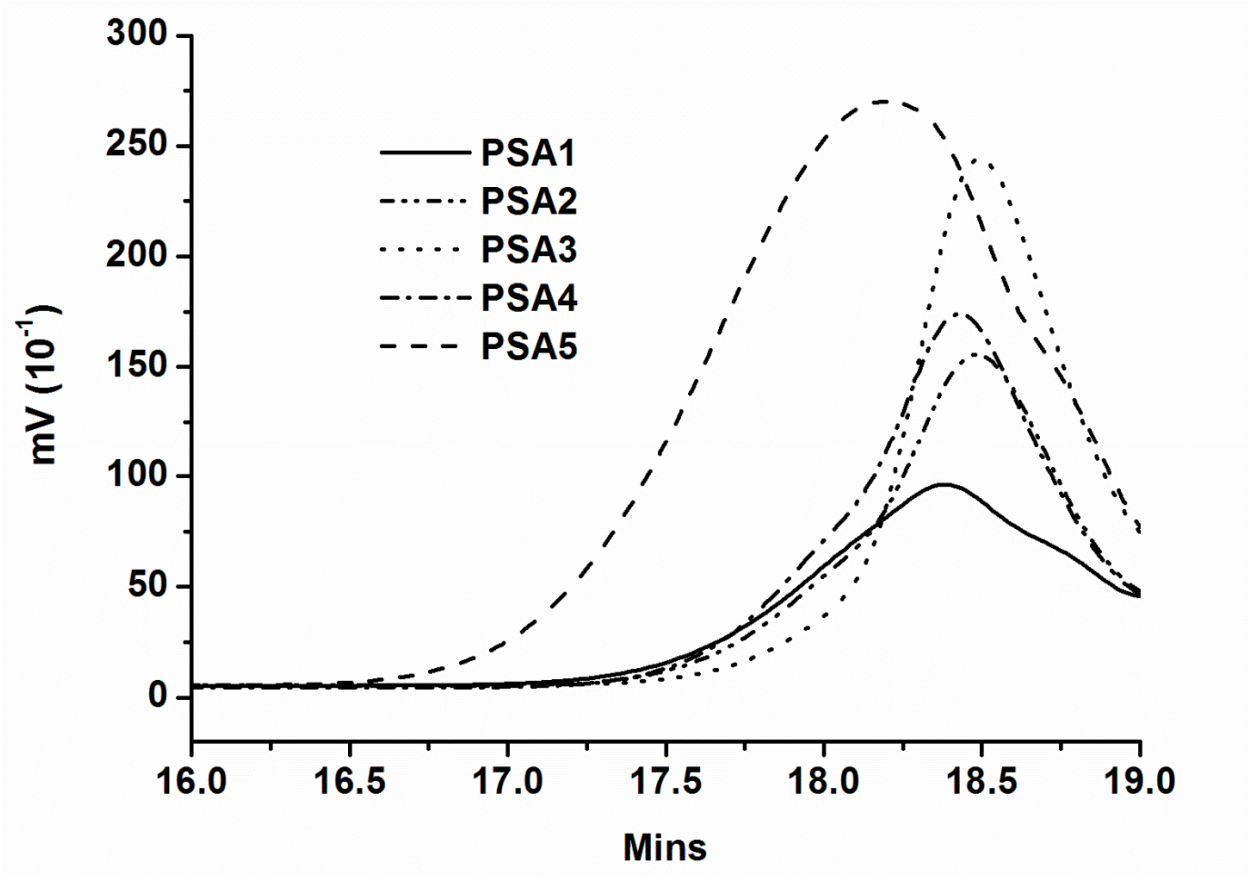

Fig. S3. The GPC trace of the synthesized linear and branched PSA.

End-capping reaction and the results of GPC-MALLS

End-capping of amino groups: In a three-neck flask, 2.3 g of polymer PSA was dissolved in 30 mL of chloroform, and then 1.5 mL of benzoyl chloride and 2 mL of triethylamine in 15 mL of chloroform solution were added to the mixture. The reaction was conducted at room temperature for 24 h with stirring under nitrogen atmosphere. The reaction mixture was washed by water. After the equilibrium of the bottom chloroform solution, the product was dehydrate by magnesium sulfate and then filtered. After being concentrated by rotary evaporation, the solution was precipitated into diethyl ether under stirring. The end-capped products were purified by re-precipitation from chloroform solution into diethyl ether, and then dried under vacuum at 60 °C for 24 h. These end-capped polymers were used to measure the molecular weights and their distributions.

The molecular weights and molecular weight distributions of end-capping PSAs were determined by gel permeation chromatography/multi-angle laser light scattering (GPC-MALLS). The gel permeation chromatography system consisted of a Waters degasser, a Waters 515 HPLC pump, a 717 automatic sample injector, a Wyatt Optilab DSP differential refractometer detector, and a Wyatt S3 mini DAWN multi-angle laser light scattering detector. Three chromatographic columns (styragel HR3, HR4, and HR5) were used in series. THF was used as the mobile phase at a flow rate of 1 mL/min at 30 °C. The refractive index increment dn/dc was determined with Wyatt Optilab DSP differential refractometer at 690 nm. Data analysis was performed with Astra software (Wyatt Technology).

Table S1. Molecular weights and polydispersity of PSAs were determined by GPC-MALSS.

No	Water/DMF (V/V)	M_n ($\times 10^3$)	M_w/M_n	dn/dc
End-capping PSA1	100/0	8.6	1.5	0.092
End-capping PSA2	80/20	7.5	1.8	0.089
End-capping PSA3	50/50	8.0	1.8	0.086
End-capping PSA4	20/80	7.0	1.9	0.092
End-capping PSA5	0/100	6.8	1.8	0.092