Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

A high-efficient, low toxic and wide-spectrum antibacterial coating designed for 3D printed implants with tailorable releasing properties

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The preparation process and source of different silver-based antibacterial agent.

1. Triangle silver nanoparticles.

Under strong stirring mixing, 100 ml solution containing 0.2 g BRIJ35 was added into 100 ml mixture solution with silver nitrate (1 mM) and sodium citrate (2 mM). Then, 0.2 mL sodium borohydride solution (0.01 M) was injected into the aforesaid solution, the initial solution will be finished after stirring for 5 min and the PH of the solution was about 5.5. Place the reaction bulb in water bath pot, sealing and keeping out of the ligt, fully reaction under stirring (60 ^{o}C, 48 h) until the colour of the solution become blue and no longer change any more, cooling and geting the final triangle silver nanoparticles. Triangle silver NPs range in size from 100nm to 150nm.[1]

2. Ordinary silver nanoparticles.

An aqueous solution of NaBH4(6 mL, 10 mM) was added to a 200 mL solution of AgNO3 (0.25 mM) and trisodium citrate (0.25 mM). The reaction was stirred for 30 min, resulting in a yellow colloidal silver solution, and was then left undisturbed overnight. The morphology is sphere and average size is about 40 nm-50 nm[2].

3. Sulfadiazine silver.

Sulfadiazine silver was bought from market.

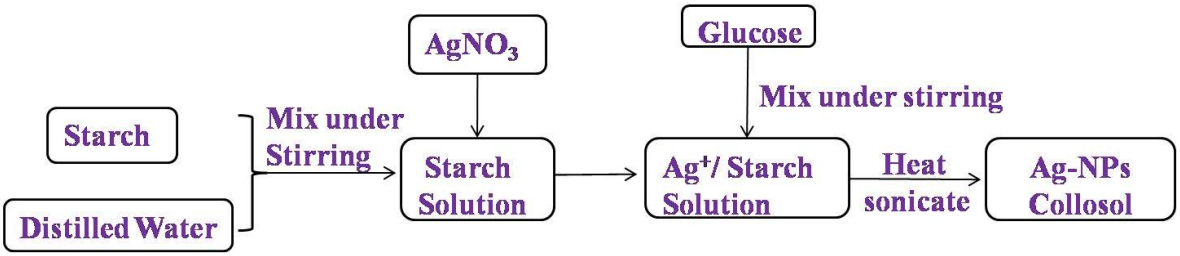


Figure S1: The schematic diagram of the green preparation process of small sized Ag-NPs collosol.

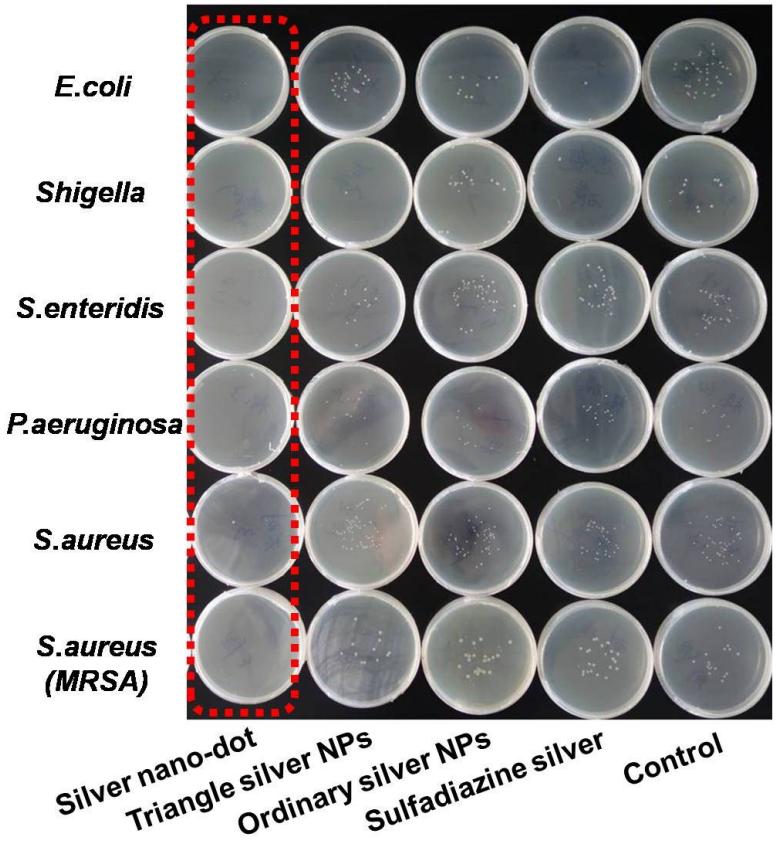


Figure S2: The antibacterial effect of four kinds of Ag through plate colony-counting methods. All the bacteria concentrations were diluted 10^6.

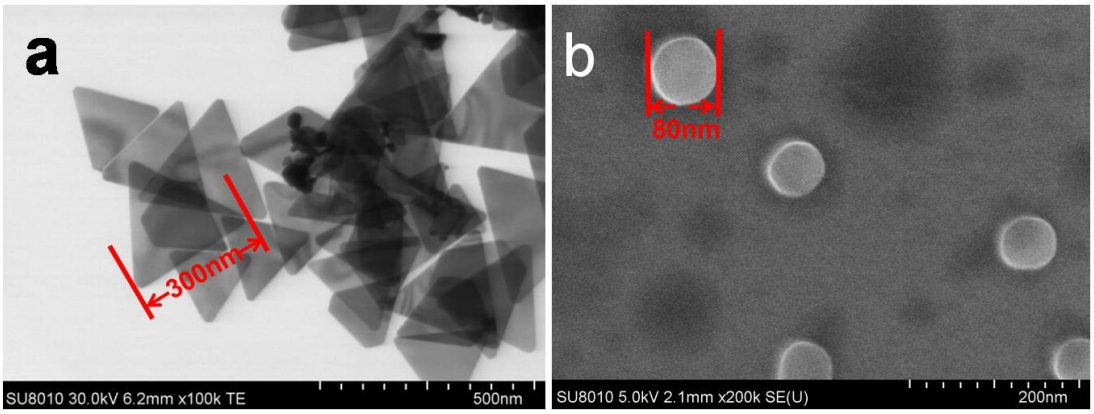


Figure S3: a) The TEM inage of triangle Ag-NPs, b) the SEM image of ordinary Ag-NPs.

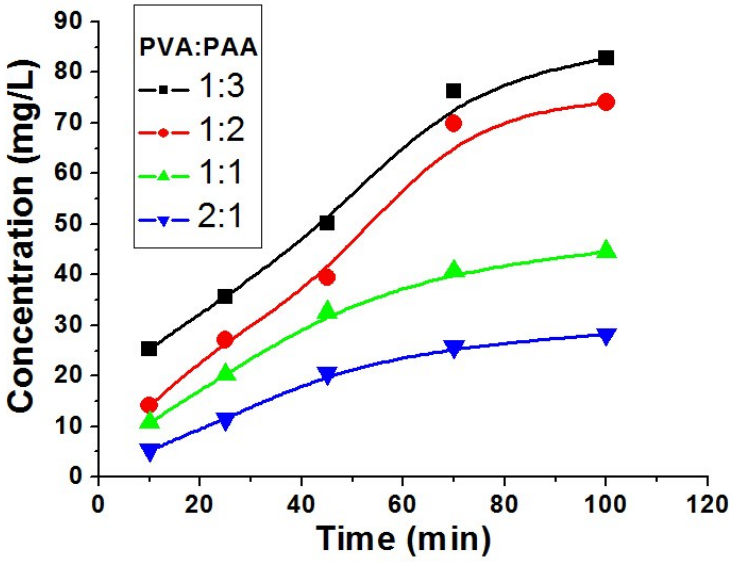


Figure S4: Release process of the Ag-NPs implant system with different ratio of PVA/PAA.

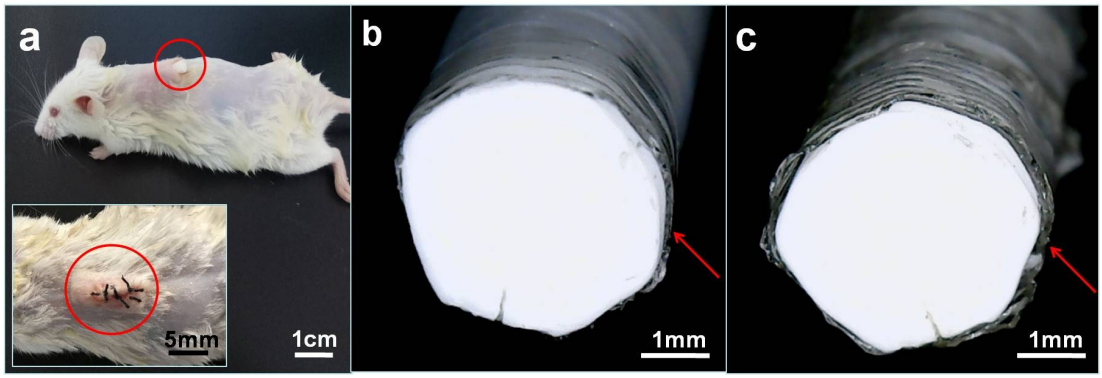
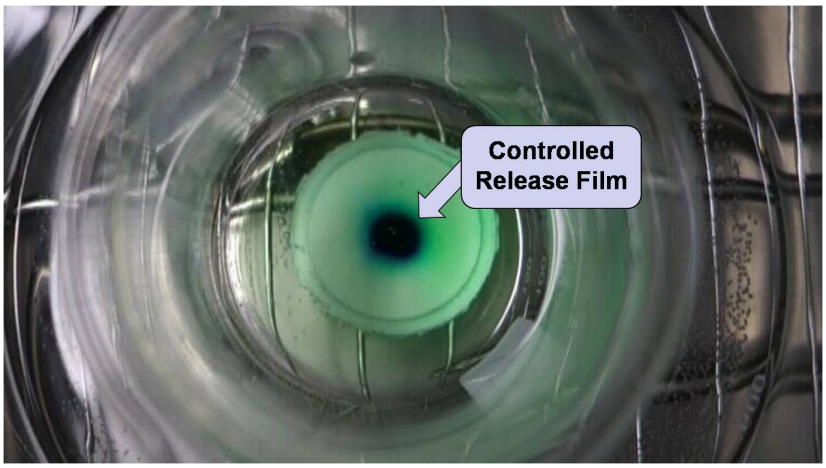


Figure S5: a) Optical photograph of mice and the 3D printing antibacterial implant (red circle). The insert is the enlarged drawing of implant location. The enlarged drawing of 3D printing implant and the surface antibacterial film (red arrow), b) before the implantationand c) after the implantation for 48 h, taken out from the body of mice.

Table S1: The contents of Ag-NPs in different organs. Ag-NPs collosol (10μg/ml) was injected into the mice through enterocoelia (0.1ml/10g) everyday, repeat the process for one week.

Organs	liver	spleen	kidney	control
Concentrations	2.17ng/mg	0.696ng/mg	0.67ng/mg	<0.01 ng/mg



Moive S1: Different compositions of PVA and PAA doping with different dye were selected to test the controlled release film. The outmost layer (PVA: PAA =1:3) was green, the middle layer (PVA: PAA =1:2) was blue and the inner layer (PVA: PAA =2:1) was red dye.

1. Wu, Q. S.; Zhao, Y.; Zhang, C. B., Preparation of triangular silver nanoplates and factors affecting the size and shape of sliver nanoporticles. *Chemical Journal of Chinese Universities-Chinese* **2005,** *26* (3), 407-411.

2. Doty, R. C.; Tshikhudo, T. R.; Brust, M.; Fernig, D. G., Extremely stable water-soluble Ag nanoparticles. *Chemistry of Materials* **2005,** *17* (18), 4630-4635.