Supporting Information

Facile and material-independent fabrication of poly(luteolin) coatings and their unimpaired antibacterial activity against *Staphylococcus aureus* after steam sterilization treatments

Jingya Cheng,[a,†] Miao Guan,[a,†] Jialiang Zhu,[b] Changtao Wang,[c] Lei Su,[a,*] and Xueji Zhang[a]

[a] Research Center for Bioengineering and Sensing Technology, School of Chemistry and Biological Engineering, University of Science and Technology Beijing, Beijing 100083, P.R. China

[b] Institute of Orthopedics, the First Affiliated Hospital of the General Hospital of PLA, Beijing 100048, P.R. China

[c] School of Science, Beijing Technology and Business University, Beijing 102488, P.R. China

* To whom correspondence should be addressed. Email: sulei@ustb.edu.cn

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Experimental details

Materials. Luteolin was purchased from Nanjing Tcm Institute of Chinese Materia Medica (China.). All other chemicals of at least analytical reagent were obtained from Sinopharm Chemical Reagent Co., Ltd. (Beijing, China). Aqueous solutions were prepared using deionized water (Milli-Q system). Different materials including stainless steel, glass, indium-tin oxide (ITO) conductive glass, highly oriented pyrolytic graphite (HOPG), and roughened gold plates were used as the substrates of PL coatings for surface analysis and antibacterial activity determination. The roughened gold plate was used for FT-IR and Raman measurements and was prepared as follows: the roughening procedure of the polycrystalline gold plate consisted of 20 oxidation-reduction cycles between -0.6 and +1.2 V vs Ag/AgCl at a sweep rate of 0.5 V s^{-1} in 0.1 M KCl solution, pausing at -0.6 V for 8 s and at +1.2 V for 3 s. Finally, the roughened gold plate was held at -0.6 V for 5 min.

Coatings Preparation. Different substrates were submerged in a freshly prepared 0.10 mM luteolin solution in 25 mM Tris buffer (pH 8.5) for 18 h at 37 ^{o}C. The samples were then taken out, rinsed using ethanol for three times, and dried in air.

Surface Analysis. Contact angles of the flat stainless steel plate and the glass plate before and after PL coating were measured on an OCA20 system (Data-Physics, Germany) at ambient temperature. The average contact angle values were obtained by measuring at five different positions on the same sample. SEM images of the ITO glass before and after PL coating were acquired using a ZEISS Supra 55 FE-SEM. AFM image of the HOPG plate coated with the PL was acquired in air with a Multimode 3D SPM instrument (Bruker) in the tapping mode. XPS analysis of the PL-coated ITO glass was carried out on a Kratos Axis Ultra spectrometer (Kratos Analytical Ltd., UK), using a monochromatic Al Ka X-ray source (1486.6 eV) at a

vacuum pressure of 10^{-8}-10^{-9} Torr. FT-IR spectra were recorded on a NEXUS model 870 Fourier transform IR spectrophotometer (Thermo Electron Corp., MA). Raman spectra were recorded on a Raman system (JY-HR800). Cyclic voltammetry characterization was performed with CHI 660D (CH Instruments, USA) in an electrolytic cell with a three-electrode configuration. The PL-coated ITO substrate was used as the working electrode, an Ag/AgCl (KCl-saturated) electrode as the reference electrode, and a platinum sheet as the counter electrode.

Antibacterial activity determination. The antibacterial properties of the treated glass slides were evaluated by ASTM E2149-01.[1] Each specimen was sterilized before the experiment with high-pressure steam sterilizer (YX-280D, Jiangyin binjiang Medical Equipment Co., Ltd, China) at 121 ^{o}C for 30 min. Gram-positive bacteria *S. aureus* was used as test organisms. A colony of *S. aureus* grown on a LB agar plate was cultivated in sterilized LB broth and then incubated overnight at 37 ^{o}C with a shaking incubator. The incubated cells in LB broth were diluted with a sterilized physiological saline to give a final concentration of 3.0-5.0×10^{3}~10^{4} colony forming units (CFU)/mL. This solution was used as a working bacterial dilution. Three pieces of glass slides (0.5×2 cm^{2}) coated with the PL were incubated with 1.5 mL of cells suspension in a 2 mL conical tube at 37 ^{o}C with a shaking incubator. An untreated glass slide was used as a control. For testing the effect of steam sterilization on the antibacterial activity of the PL coatings, the PL coatings on glass surfaces were treated with high-pressure steam sterilizer at 121 ^{o}C for 30 min, and then were incubated with 1.5 mL of cell suspension in a 2 mL conical tube at 37 ^{o}C with a shaking incubator. This steam sterilization and the subsequent incubation processes were repeated three times. Samples were taken after 24 h, and plated on LB agar plates. The inoculated plates were incubated at 37 ^{o}C for 24 h, and the surviving cells

were counted. All determinations were made in triplicate. The antibacterial activity was expressed as R= % reduction of the organism after contact with the test samples compared to the number of *S. aureus* cells surviving after contact with the control.[2]

1. A. Kugel, S. Stafslien and B. J. Chisholm, *Progress in Organic Coatings*, 2011, **72**, 222-252.
2. A. Hou, M. Zhou and X. Wang, *Carbohydr. Polym.*, 2009, **75**, 328-332.

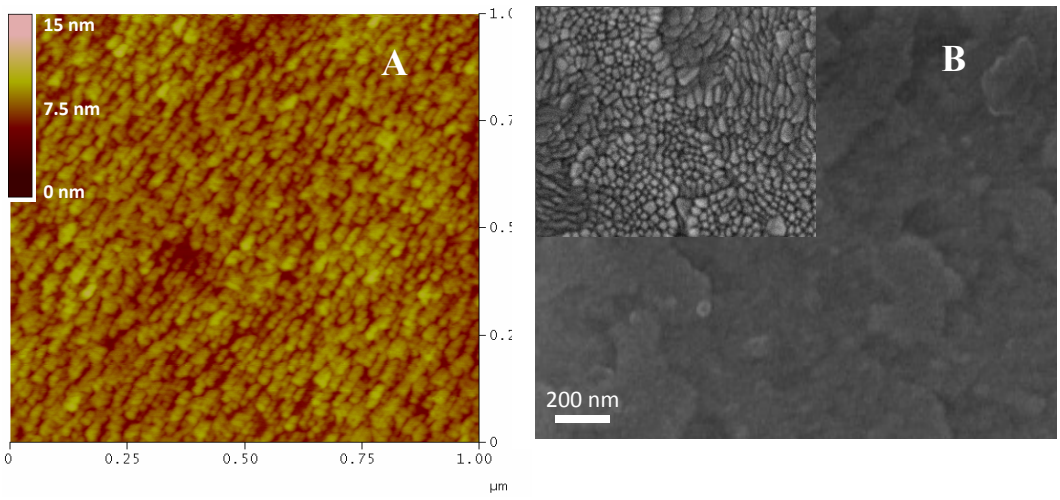

Figure S1. (A) AFM image of the PL-coated HOPG carbon. (B) SEM image of the PL-coated ITO glass. Inset: image of bare ITO glass.

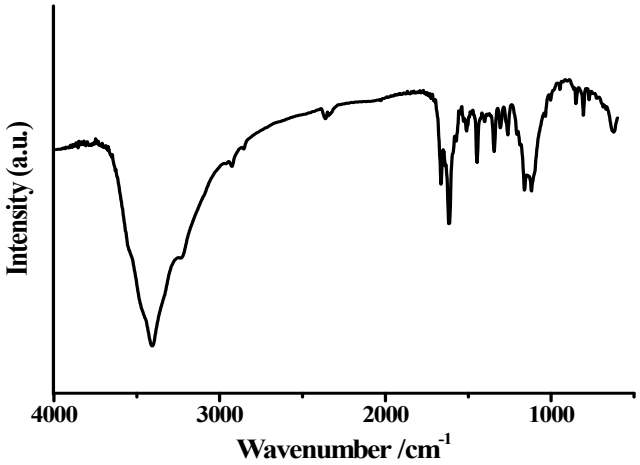

Figure S2. FT-IR spectrum of the luteolin.

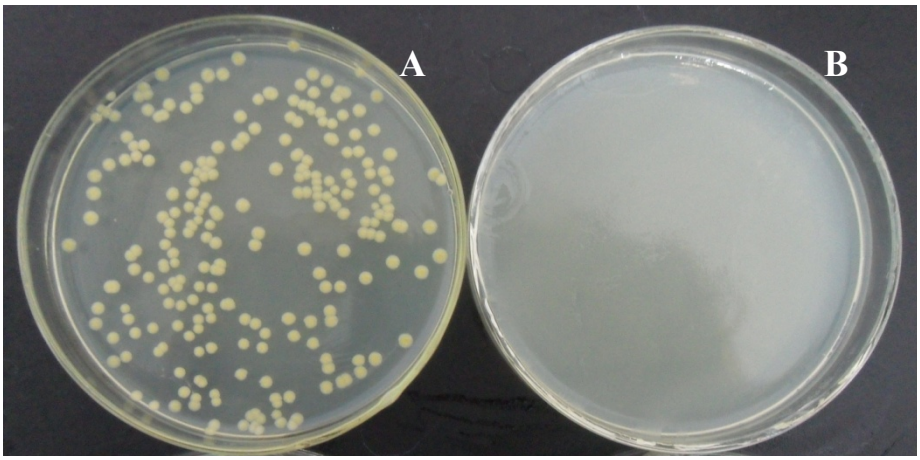

Figure S3. Photographs of LB agar plates onto which the *S. aureus* suspension treated with the bare glass slides (A) and the PL-coated glass slides (B) were deposited and incubated for 24 h.