## Supporting Information

Liquid metal exfoliation of two dimensional polydopamine nanosheets for templated assembly of noble metal nanoparticles

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## **Experimental section**

Materials. Liquid Gallium indium alloy (Eutectic gallium indium, EGaIn, 75% Ga, 25% In) and dopamine hydrochloride were from Sigma-Aldrich. Noradrenaline bitartrate monohydrate was from Aladdin. Hydrochloric acid was from Beijing Chemical Works. Silver nitrate was from Sinopharm Chemical Reagent Co., Ltd. Characterization. Scanning electron microscopy (SEM), including energy-dispersive X-ray (EDX) analysis were performed on a Hitachi S4800 electron microscope and a Hitachi SU8220 electron microscope equipped with an EDX analyzer. Transmission electron microscopy (TEM) was performed on an HT 7700 electron microscope operated at 80 kV and a Tecnai G2 20 S-TWIN electron microscope operated at 200 kV. Data were analyzed by ImageJ. X-ray photoelectron spectroscopy (XPS) analysis was performed on a Thermo Scientific ESCALAB 250XI photoelectron spectrometer. Data were analyzed by CasaXPS. The binding energies were calibrated with C 1s (284.8 eV). Atomic force microscopy (AFM) was performed on a Bruker Multimode-8 scanning probe microscope. Images were processed by Nanoscope Analysis 1.8. Ultraviolet-visible (UV-Vis) light absorption spectra were recorded on a UV-2450 UV-Vis spectrophotometer.

LM-assisted exfoliation of PDNSs and PNNSs. Glass slides (2 cm × 2 cm) were immersed in agua regia overnight, washed with distill water and ethanol, and dried at 80 °C. In a typical synthesis of PDNSs, 20 µL liquid metal EGaIn was rubbed onto a glass slide to obtain a continuous film. The slide was then immersed in the dopamine chloride solution (1 mg/mL in 10 mM pH 8.5 Tris-HCl buffer) in a 6-well plate. The reaction proceeded for 2 h under gentle shaking (to directly visualize the PD coating on EGaIn, the reaction time was set as 12 h). After that, the slide was thoroughly washed with distill water and dried in the air. 200 µL hydrochloric acid (0.1 M) was then added onto the slide. After 5 seconds, the solution was collected and stored at 4 °C for use. To prepare PNNSs, dopamine hydrochloride was replaced with noradrenaline bitartrate monohydrate, and the reaction time was prolonged to 6 h. PDNSs-templated assembly of silver nanocubes (AgNCs). PDNSs were transferred onto a substrate, for example, a copper grid, by casting a drop of PDNSs solution. After drying, the copper grid was washed with distill water and then immersed in the silver nitrate solution (1 mM). After 1 h, the grid was fished out, thoroughly washed with distill water, and dried in the air.

## Supplementary figures



**Figure S1.** Low magnification SEM image of PD-coated EGaIn surface. The EGaIn film is immersed in 1 mg/mL dopamine chloride solution for 12 h. Scale bar: 20  $\mu$ m.



Figure S2. XPS spectrum of PD-coated EGaIn.



**Figure S3.** SEM image of PD-coated EGaIn surface. The EGaIn film is immersed in 1 mg/mL dopamine chloride solution for 2 h. Scale bar:  $20 \mu m$ .



**Figure S4.** Low magnification SEM image of the released PDNSs. Dopamine chloride (1 mg/mL) is allowed to polymerize for 2 h. The PDNSs are cast on a copper grid. Scale bar: 10  $\mu$ m.



**Figure S5.** UV-Vis spectra of PDNSs and bulk PD aggregates. Dopamine chloride (1 mg/mL) is allowed to polymerize for 2 h on EGaIn, and the product in the supernatant is collected as bulk PD aggregates.



Figure S6. XPS spectrum of PDNSs.



**Figure S7.** Characterization of PNNSs. (a) The molecular structure of norepinephrine. (b) and (d) TEM images of PNNSs. (c) SEM image of PNNSs. Scale bar: 1  $\mu$ m in (b-d).



**Figure S8.** PDNSs as reductive template for the assembly of AgNCs. (a) SEM image of an individual PDNSs/AgNCs framework. Scale bar: 1  $\mu$ m. (b-c) TEM images of PDNSs-templated AgNCs frameworks. Scale bar: 1  $\mu$ m in (a) and (b), 500 nm in (c).



**Figure S9.** TEM (a) and SEM (b) images of the product obtained by the reaction of copper grid with AgNO<sub>3</sub>. The laminated structures may be dried Ag salt. No AgNCs are observed. Scale bar: 1  $\mu$ m in (a-b).