Supplementary Information

Facile Fabrication of a Novel Nanoporous Au/AgO Composite for Electrochemical Double-Layer Capacitor

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To determine the applied potential for dealloying Ag-Au alloy in H_2SO_4 solution, electrochemical properties of pure gold, pure silver and Ag-Au alloy were studied, and the corresponding positive-going LSV curves are shown in Figure S1a. Due to the lower electrochemical stability of silver compared with gold, oxidation of the silver induce a convex hull in Ag-Au alloy LSV curve between 0.7 and 1.3 V. However, the phenomenon was not been observed in the previous work,[1-3] the reason was like that the oxidation of silver is only confined to the surface. In order to obtain optimal structure, we choose 1.8 V as the applied potential to drive dealloying process as marked in Figure S1a. The whole reaction can be divided into two steps as shown in Figure S1b. In the first step, Ag-Au alloy was electrochemically dealloyed at 1.8 V for 20 min. In the second step, stripping of the AgO floccule out of the surface was happened at 0 V for 1 min.

The peaks of Ag-Au alloy at 368.1 and 374.1 eV can be assigned to Ag $3d_{5/2}$ and Ag $3d_{3/2}$ of the metallic Ag as shown in Figure 4a. The 6 eV splitting of the 3d doublet also confirms the metallic nature of Ag-Au alloy.[4] After dealloying and the subsequently stripping, the peaks of Ag $3d_{5/2}$ and Ag $3d_{3/2}$ shifted to 367.7 and 373.7 eV, which suggests that the silver atoms is in an oxidation state (divalent).[5] In addition, the XPS result reveals that no Ag is in a zero valence state, which is consistent with XPS component analysis result shown in Table S1. From Table S1, it can be seen that AgO takes up approximately 15 at. % in NPAAC. To Au, it is found that it is difficult to detect the signals by XPS after electrochemical dealloying, the reason of which should be attributed to the formation of AgO floccule on the surface.

Due to the natural inertness, Au remains in a zero valence state after the whole electrochemical reaction process as shown in Figure S2b.

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4. Wagner, C. D.; Riggs, W. M.; Davis, L. E.; Moulder, J. F. In: G.E. Muilenberg, Editor. Handbook of X-Ray Photoelectron Spectroscopy. Perkin-Elmer Corporation Physical Electronics Division, Minnesota, **1978**, p. 112.

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Tables:

Table S1. Surface component analysis of the Ag-Au alloy, the sample after dealloying, and the sample after stripping

Samples	Au, at.%	Ag, at.%	O, at.%
Ag-Au alloy	32.0	68.0	/
After dealloying	2.5	48.1	48.9
After stripping	70.2	14.0	15.8

Figures:

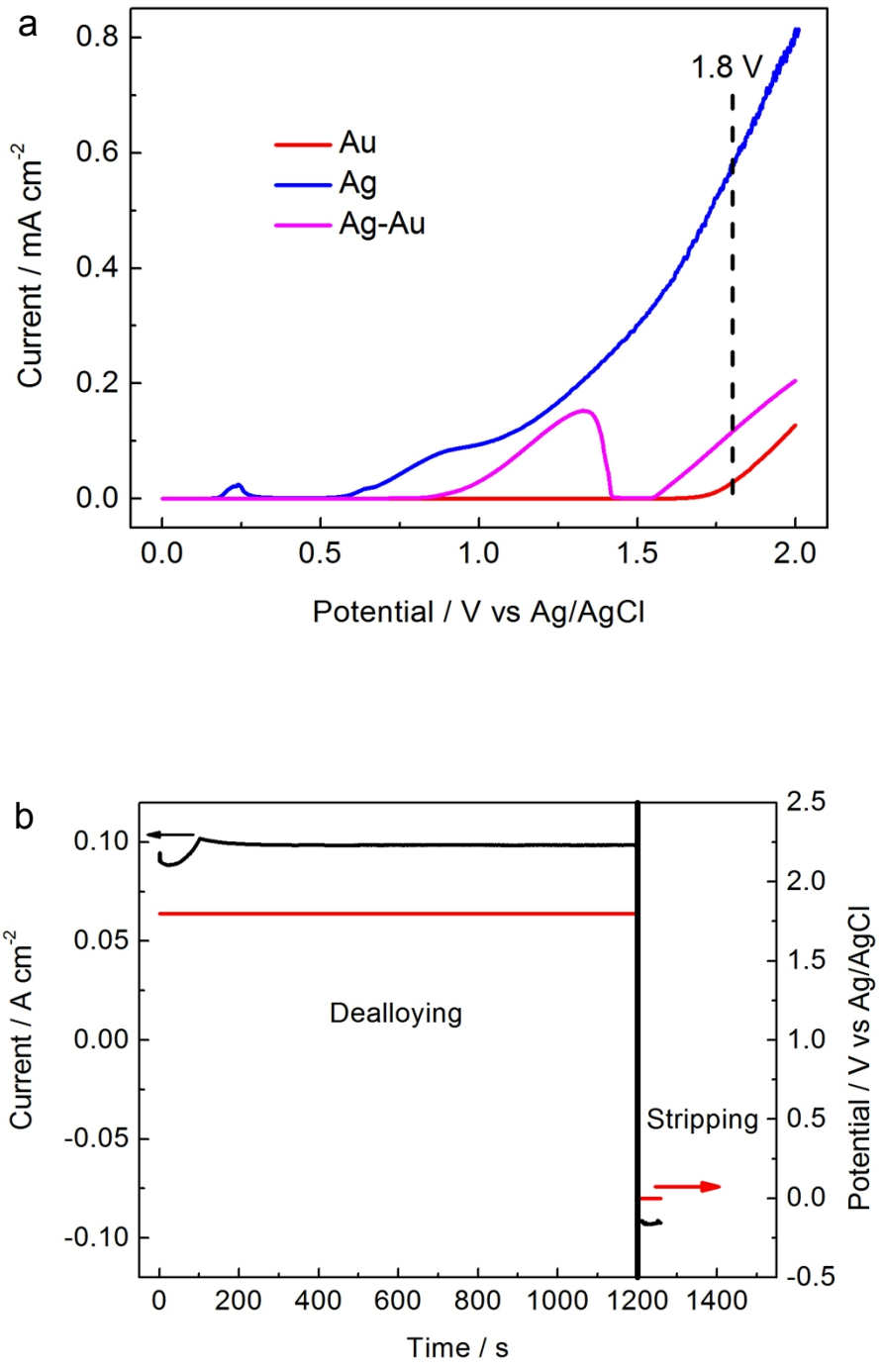

Figure S1. (a) Positive-going LSV curves of Au, Ag and the Ag-Au alloy at a scan rate of 100 mV/s. (b) Current *vs.* time curve (the black) of the Ag-Au alloy at two different potentials (the red).

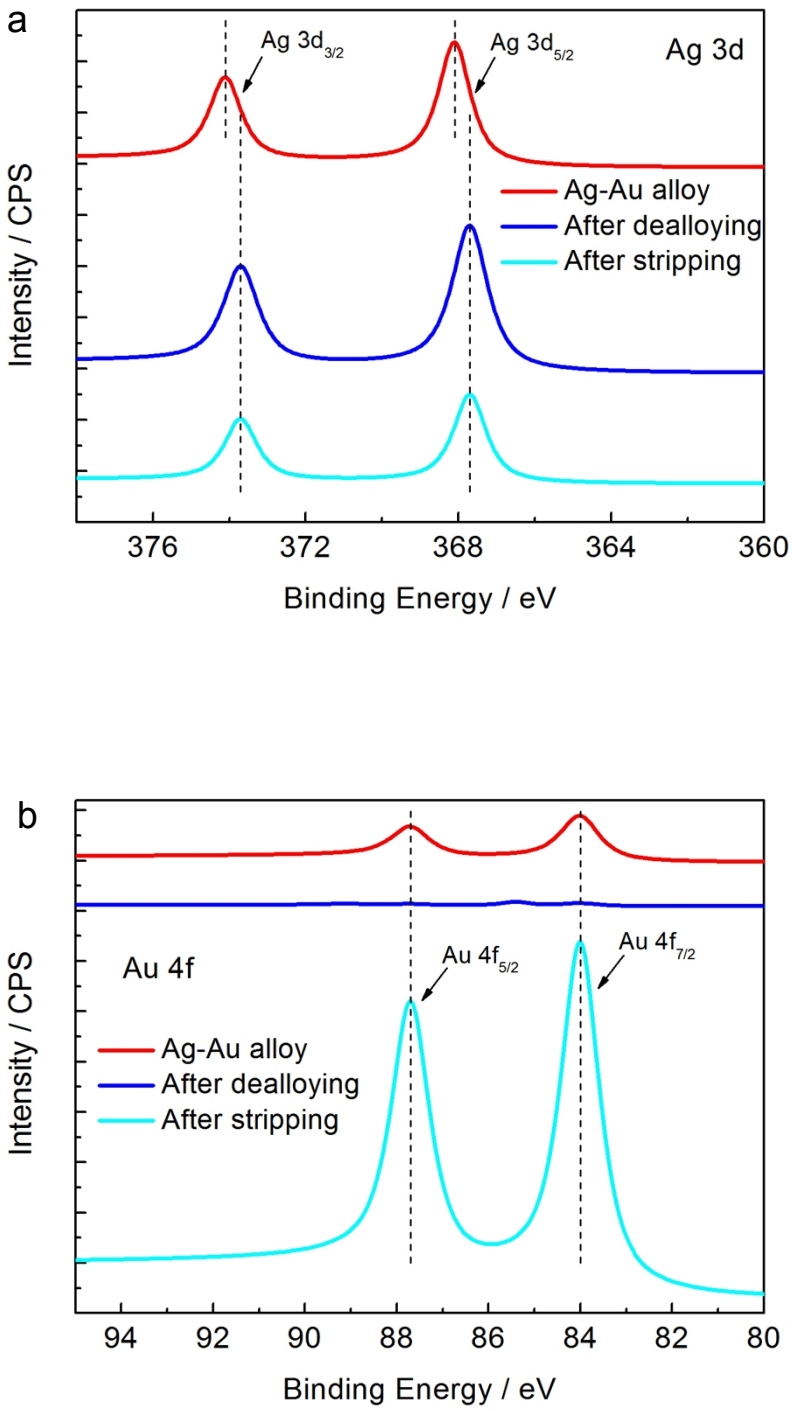

Figure S2. The Ag 3d (a) and Au 4f (b) XPS spectra of the Ag-Au alloy, the sample after dealloying and the sample after stripping.

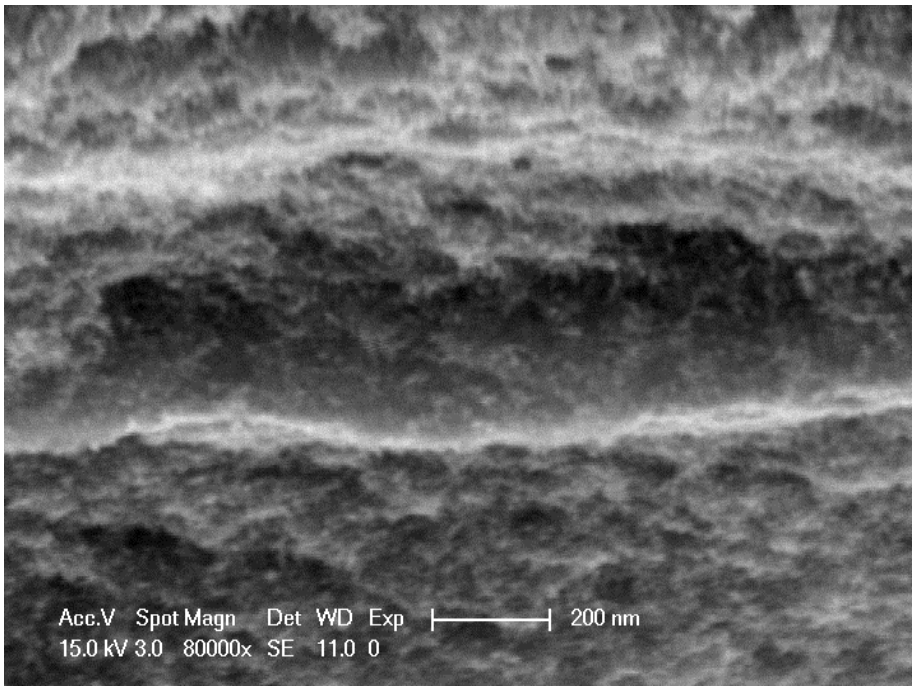

Figure S3. SEM image of the as-fabricated NPAAC sample (corresponding to the CV curve in Figure 4f).