Supporting Materials

Scanning electron microscopy (SEM) was used to evaluate the quality of AgCl layer on Ag thin-film. From the top-view, the fill-factor is a quality parameter. In addition, the cross-sectional view also measured with SEM is used to observe the layer stack. Figure S1 shows cross-sectional SEM images of the fabricated pREs for various reaction times. In sample #1, bare Ag thin-film with a thickness of 200 nm is deposited using an electron-beam evaporator on the silicon dioxide layer. After 30 s of reaction (sample #2), AgCl grains formed, however, the AgCl grains have not covered the entire surface yet. After a sudden drop of the reaction current (Fig. 2a, sample #3), the AgCl grains covered the overall surface uniformly where ~100-nm of Ag layer still remains under the AgCl layer. In sample #4, only the AgCl layer is observed, however, vulnerable to mechanical stress and easily peeled out due to damage on the adhesive 20 nm thick Ti layer.

![Figure S1](image_url)

Figure S1. Cross-sectional SEM images of the Ag/AgCl layer after electrochemical treatment with various reaction times: (a) 0 s, (b) 30 s, (c) 60 s, and (d) 600 s, respectively.