**Supporting information**

**Fabrication of black-silicon microneedle array****s** **for high drug loading**

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**Figure S1.** SEM images of Ag-NPs deposited on the surfaces of Si-MNs in AgNO3/HF aqueous solutions with HF concentrations of (a) 0.005 mol/L, (b) 0.009 mol/L, and (c) 0.014 mol/L.



**Figure S2.** Water contact angles of the surfaces of the corresponding BSi-MNs at HF concentrations of (a) 0.005 mol/L, (b) 0.009 mol/L, and (c) 0.014 mol/L.



**Figure S3.** Photographs of the Si-MN patch (left) and BSi-MN patch (right).