# Electronic Supplementary Information

Unveiling the shape-diversified silicon nanowires made by HF/HNO$_3$ isotropic etching with the assistance of silver

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Figure S1 demonstrates the representative HRTEM (high resolution transmission electron microscope) image of an etched nanowire using HNO$_3$ (1.2 M)/HF (4.8 M) aqueous mixtures. It can be clearly found the formed nanowire is single crystalline in microstructure with d-spacing of 0.54 nm, which corresponds to the {100} crystallographic planes.
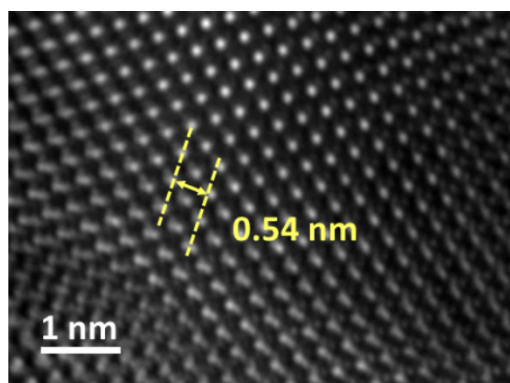
Figure S1 Representative HRTEM image of an etched nanowire prepared with Ag-assisted HF/HNO$_3$ etching process.

Figure S2 presents the representative cross-sectional SEM images of etched nanowires fabricated using H$_2$O$_2$ (1.2 M)/HF (4.8 M) mixed solutions. Prior to etching process, Si substrates were loaded in the electrolessly plating solution containing AgNO$_3$ (0.005 M) and HF (4.5 M) for 30s. As shown in Figure S2(a), the etching topographies of nanowire arrays are rather rough with uneven top surfaces while using H$_2$O$_2$ as oxidants. In addition, the nanopores also can be observed occurring at the sidewall of rough nanowires, as evidenced in Figure S2(b). These features are mainly attributed to the dissolution and re-deposition of primary Ag catalysts initiated by H$_2$O$_2$ oxidants, where the re-deposited Ag nanoclusters experienced the local dissolution of Si on exposed Si during etching process, thus resulting in the multiple etching pathways for constructing the rough and porous Si nanowires. Notice that the porous Si nanowires were formed when applying either Ag-assisted HF/H$_2$O$_2$ or HF/HNO$_3$ on heavily doped Si substrates.
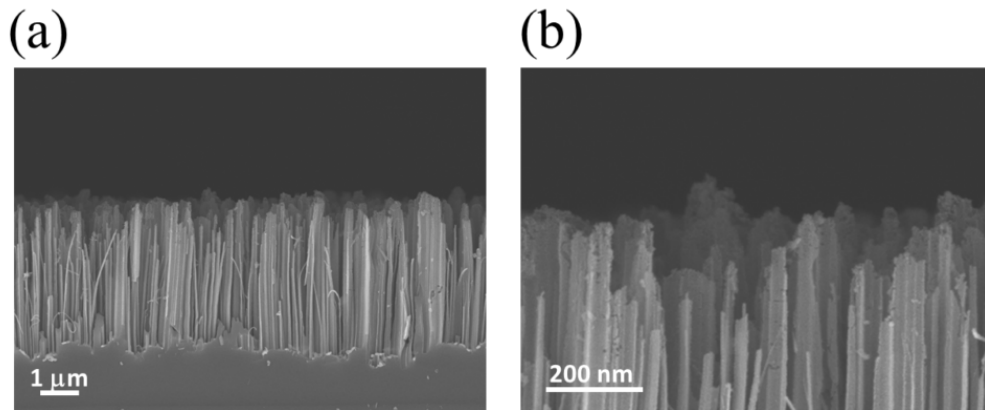
Figure S2 (a) Representative cross-sectional SEM image of etched nanowires fabricated using H_2O_2/HF mixed solutions. The crossponding high-magnification SEM image of nanowire arrays is demonstrated in Figure S2(b).