Supporting information

Growth Behavior of Au/Cu$_{2-x}$S Hybrids and Their Plasmon-enhanced Dual-functional Catalytic Activity

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**Figure S1.** XRD pattern of half-shell Au/Cu$_{2-x}$S hybrids.

**Figure S2.** Fenton-like catalytic activity of half-shell Au/Cu$_{2-x}$S tested by changing the concentration of MB (a) and H$_2$O$_2$ (b).
Figure S3. Schematic illustration of energy band diagram of Au/Cu$_{2-x}$S hybrids.

Figure S4. High magnification TEM image of half-shell Au/Cu$_{2-x}$S hybrids.

Figure S5. Extinction spectra of core-shell Au/Cu$_{2-x}$S hybrids synthesized with cupric nitrate and cupric acetate.
**Figure S6.** Extinction spectra of core-shell Au/Cu$_{2-x}$S and physical mixture of Au and Cu$_{2-x}$S.

**Figure S7.** Low-magnification TEM image of Au/Cu$_{2-x}$S nanorods generated after 2 hrs of reaction.