

Electronic Supplementary Information

Synthesis and growth mechanism of ultrafine silver nanowires by using 5-chloro-2-thienylmagnesium bromide as the additive

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KEYWORDS Silver nanowires; Polyol method; Grignard reagent; Poly(vinylpyrrolidone), 5-Chloro-2-thienylmagnesium bromide

This file includes:

Figure S1: (a-c) SEM images and (d) UV-vis spectra of AgNWs synthesized at different molar ratios of $C_4H_2BrClMgS/AgNO_3$. (a) 0.004, (b) 0.006, and (c) 0.008. Histogram of statistics about diameter of Ag NWs (e corresponds to a, f corresponds to c). The molar ratio of PVP/ $AgNO_3$ is 0.75, and the reaction temperature is at 443 K.

Figure S2: SEM images and (d) UV-vis spectra of AgNWs synthesized at different molar ratios of PVP/ $AgNO_3$. (a) 0.5, (b) 0.75, and (c) 1.0. Histogram of statistics about diameter of Ag NWs (e corresponds to a, f corresponds to c). The molar ratio of $C_4H_2BrClMgS/AgNO_3$

is 0.006 , and the reaction temperature is at 443 K.

Figure S3: (a-c) SEM images and (d) UV-vis spectra of AgNWs synthesized at different reaction temperature. (a) 433 K, (b) 443 K, and (c) 453 K. Histogram of statistics about diameter of Ag NWs (e corresponds to a, f corresponds to c). The molar ratio of $C_4H_2BrClMgS/AgNO_3$ and $PVP/AgNO_3$ is 0.006 and 0.75.

Figure S4: EDS and SEM results of the as-synthesized nanoparticles when the reaction increasing up to 368 K by using $C_4H_2BrClMgS$ as the additive.

Figure S5: EDS and SEM results of the as-synthesized nanoparticles when the reaction increasing up to 368 K by using NaBr and NaCl as dual additives.

Figure S6: SEM images of AgNWs obtained by using NaBr and NaCl as dual additives. The molar ratio of $NaBr/AgNO_3$, $NaCl/AgNO_3$ and $PVP/AgNO_3$ is 0.006, 0.006 and 0.75, and the reaction temperature is at 443 K.

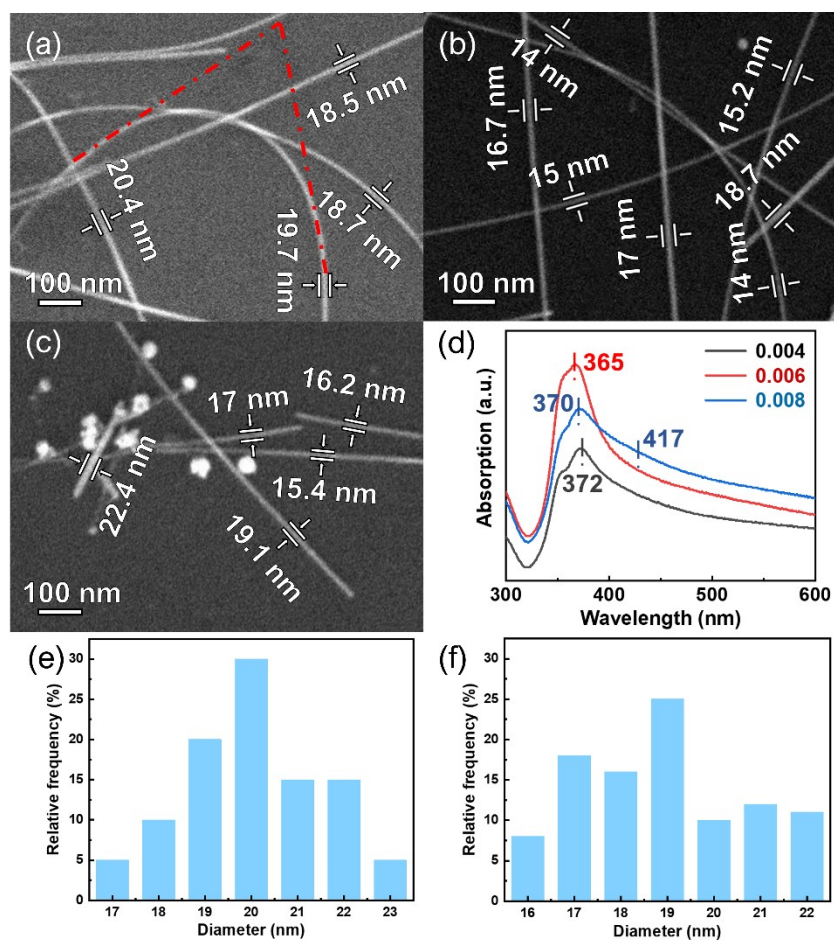


Figure S1. (a-c) SEM images and (d) UV-vis spectra of AgNWs synthesized at different molar ratios of $C_4H_2BrClMgS/AgNO_3$. (a) 0.004, (b) 0.006, and (c) 0.008. Histogram of statistics about diameter of Ag NWs (e corresponds to a, f corresponds to c). The molar ratio of PVP/ $AgNO_3$ is 0.75, and the reaction temperature is at 443 K.

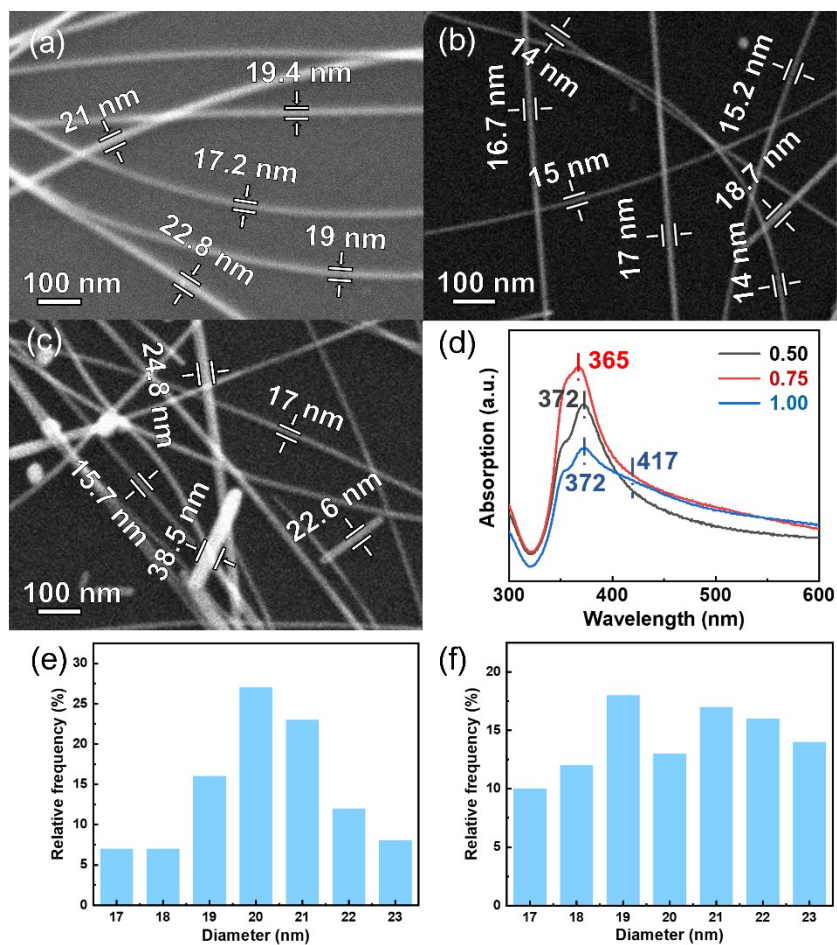


Figure S2. (a-c) SEM images and (d) UV-vis spectra of AgNWs synthesized at different molar ratios of PVP/AgNO₃. (a) 0.5, (b) 0.75, and (c) 1.0. Histogram of statistics about diameter of Ag NWs (e corresponds to a, f corresponds to c). The molar ratio of C₄H₂BrClMgS/AgNO₃ is 0.006, and the reaction temperature is at 443 K.

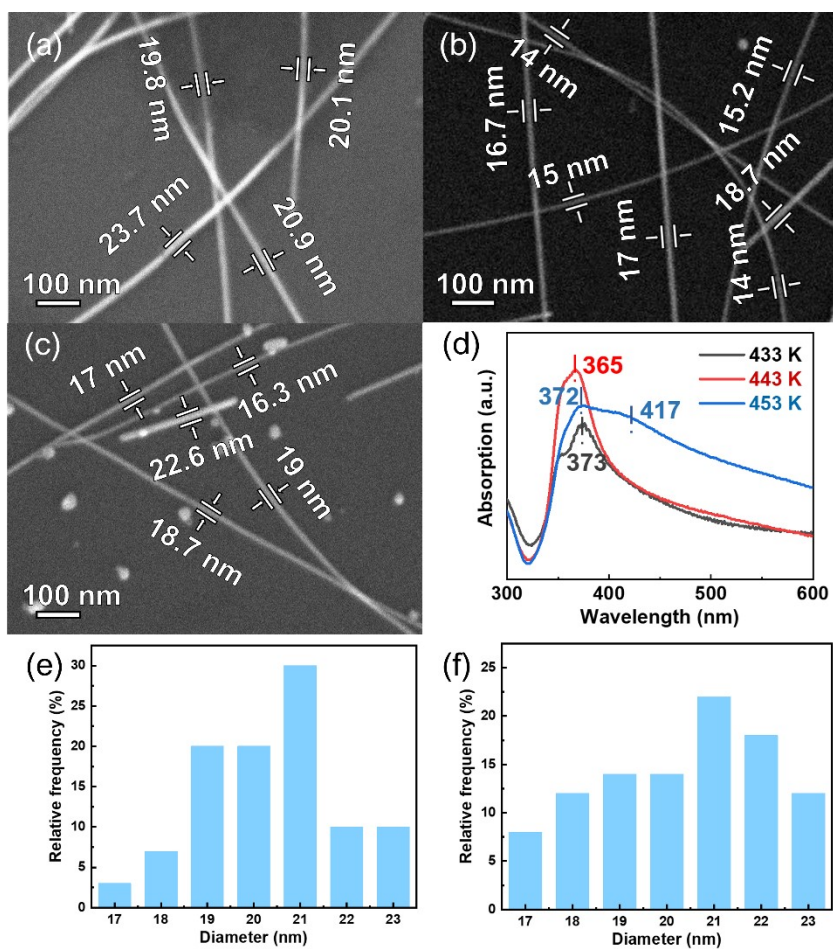


Figure S3. (a-c) SEM images and (d) UV-vis spectra of AgNWs synthesized at different reaction temperature. (a) 433 K, (b) 443 K, and (c) 453 K. Histogram of statistics about diameter of Ag NWs (e corresponds to a, f corresponds to c). The molar ratio of $C_4H_2BrClMgS/AgNO_3$ and PVP/ $AgNO_3$ is 0.006 and 0.75.

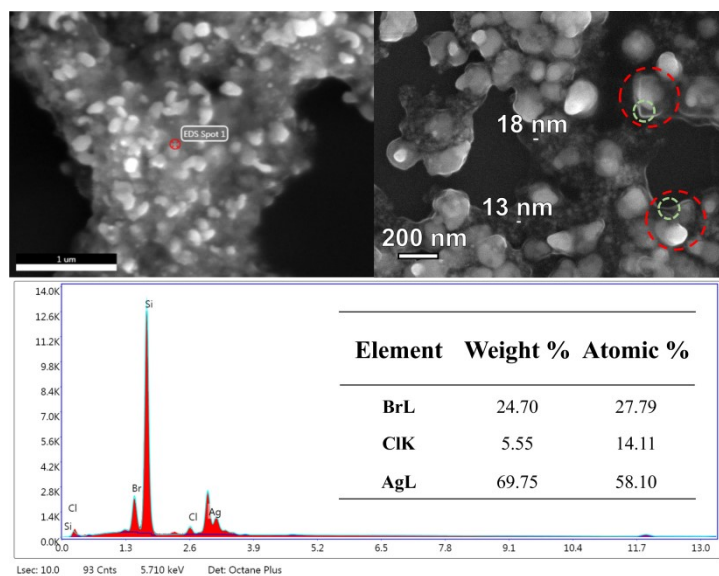


Figure S4. EDS and SEM results of the as-synthesized nanoparticles when the reaction increasing up to 368 K by using $C_4H_2BrClMgS$ as the additive (the SEM image right-top composed with the bottom EDS spectrum indicates that small AgBr and AgCl particles were produced mixed with the remaining unreacted $C_4H_2BrClMgS$ (red dashed circle), which can easily decompose under the electron beam of SEM).

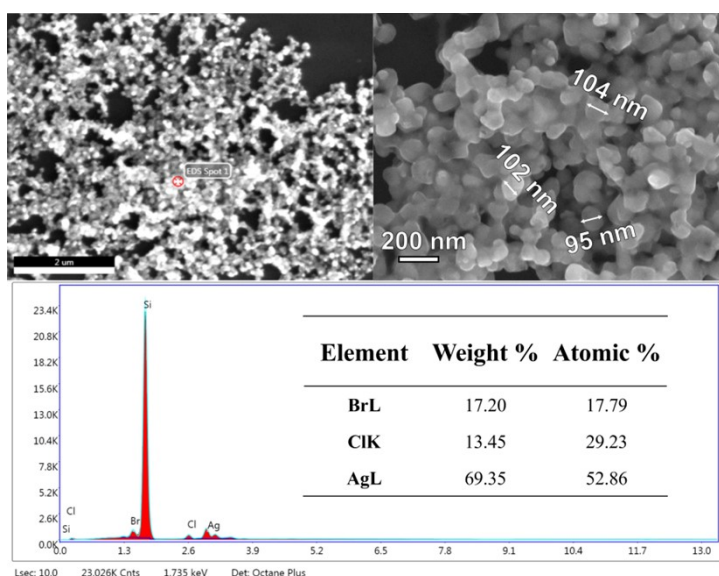


Figure S5. EDS and SEM results of the as-synthesized nanoparticles when the reaction increasing up to 368 K by using NaBr and NaCl as dual additives.

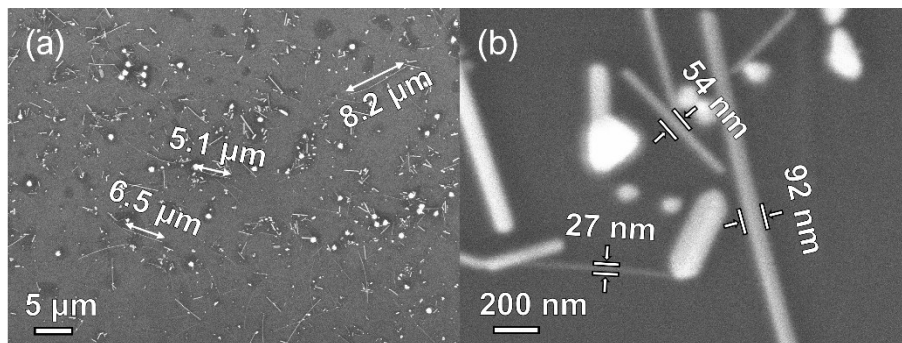


Figure S6. SEM images of AgNWs obtained by using NaBr and NaCl as dual additives. The molar ratio of NaBr/AgNO₃, NaCl/AgNO₃ and PVP/AgNO₃ is 0.006, 0.006 and 0.75, and the reaction temperature is at 443 K.