

Supplementary Information

Supercooling suppression in the tetrahydrofuran clathrate hydrate formation

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Transmission electron microscopic observation

Transmission electron microscope (TEM, JEOL, ARM200F, acceleration voltage: 200 kV) was performed to investigate the particle size of Ag_3PO_4 and AgO in the THF aqueous solution ($x = 0.0556$). For each sample, the solution was dropped on to a microgrid with a carbon support film at room temperature, and the solvent was volatilized and dried to obtain a sample for observation. Electron beam diffraction patterns were obtained to identify the crystal structure.

Results

Figures S1 and **S2** show the TEM images and the electron beam diffraction patterns of the nanoparticles formed from Ag_3PO_4 or AgO in the THF aqueous solution, respectively.

When Ag_3PO_4 was added in the THF aqueous solution, the nanoparticles (in several tens of nanometer order) existed with the original chemical (in micrometer order, not shown) before added in THF aqueous solution. Electron beam diffraction patterns suggested that the nanoparticles were mostly Ag, although the pattern did not agree perfectly with that of reference.

In the case of AgO in the THF aqueous solution, a number of nanoparticles from 5 nm to 20 nm existed with the original chemical (in micrometer order, not shown) before added in THF aqueous solution. In addition, a nanoparticle seemed to be crystalline. The major spots in the electron beam diffraction pattern can be indexed to Ag. Unattributed spots are likely to be Ag_2O or AgO , making it difficult to judge.

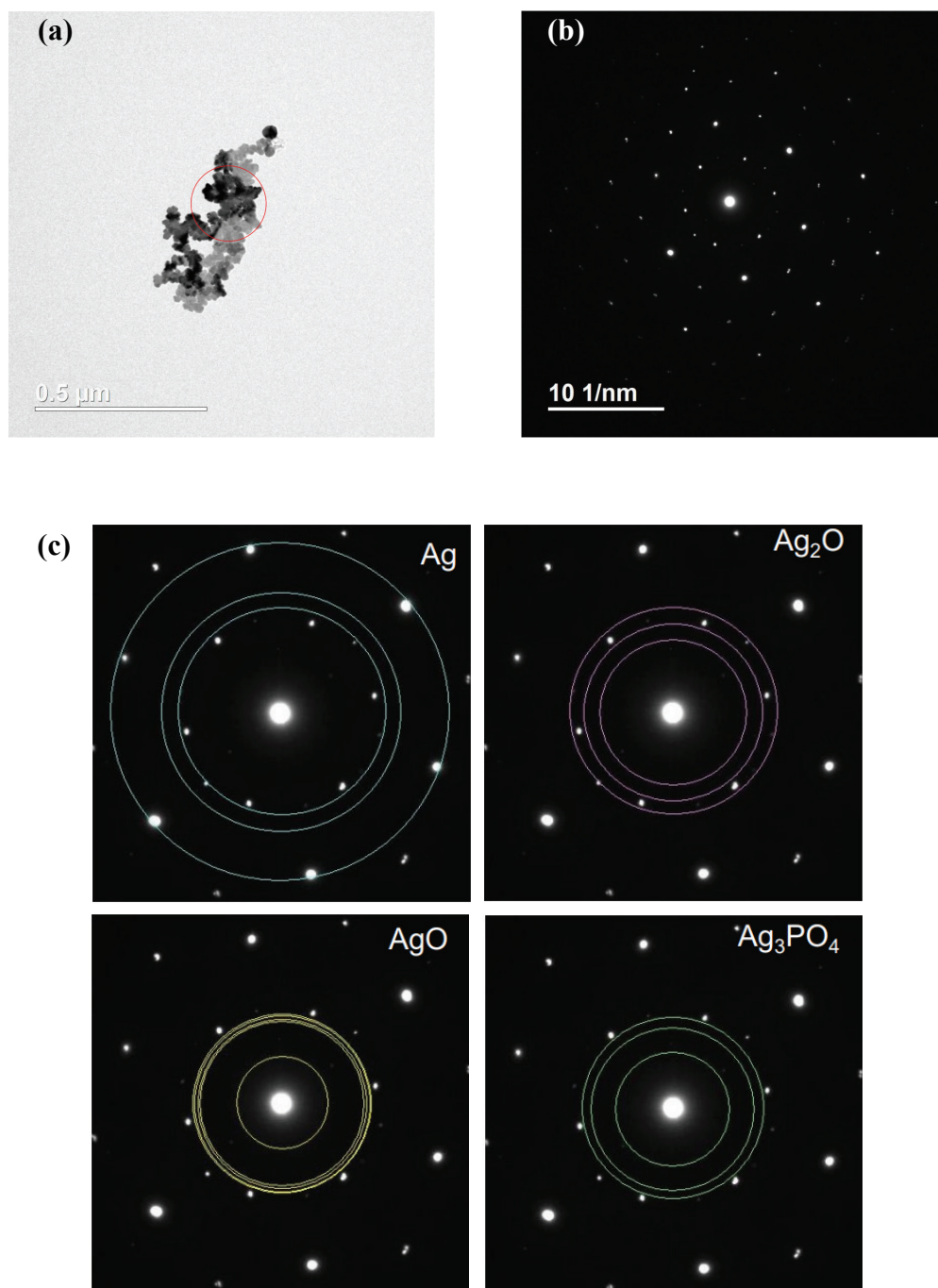


Figure S1. (a) TEM image of nanoparticles after Ag_3PO_4 was added in the THF aqueous solution. (b) Electron beam diffraction patterns of (a) red circle. (c) Superimposition of electron beam diffraction patterns and calculated values (color rings) of Ag, Ag_2O , AgO, and Ag_3PO_4 .

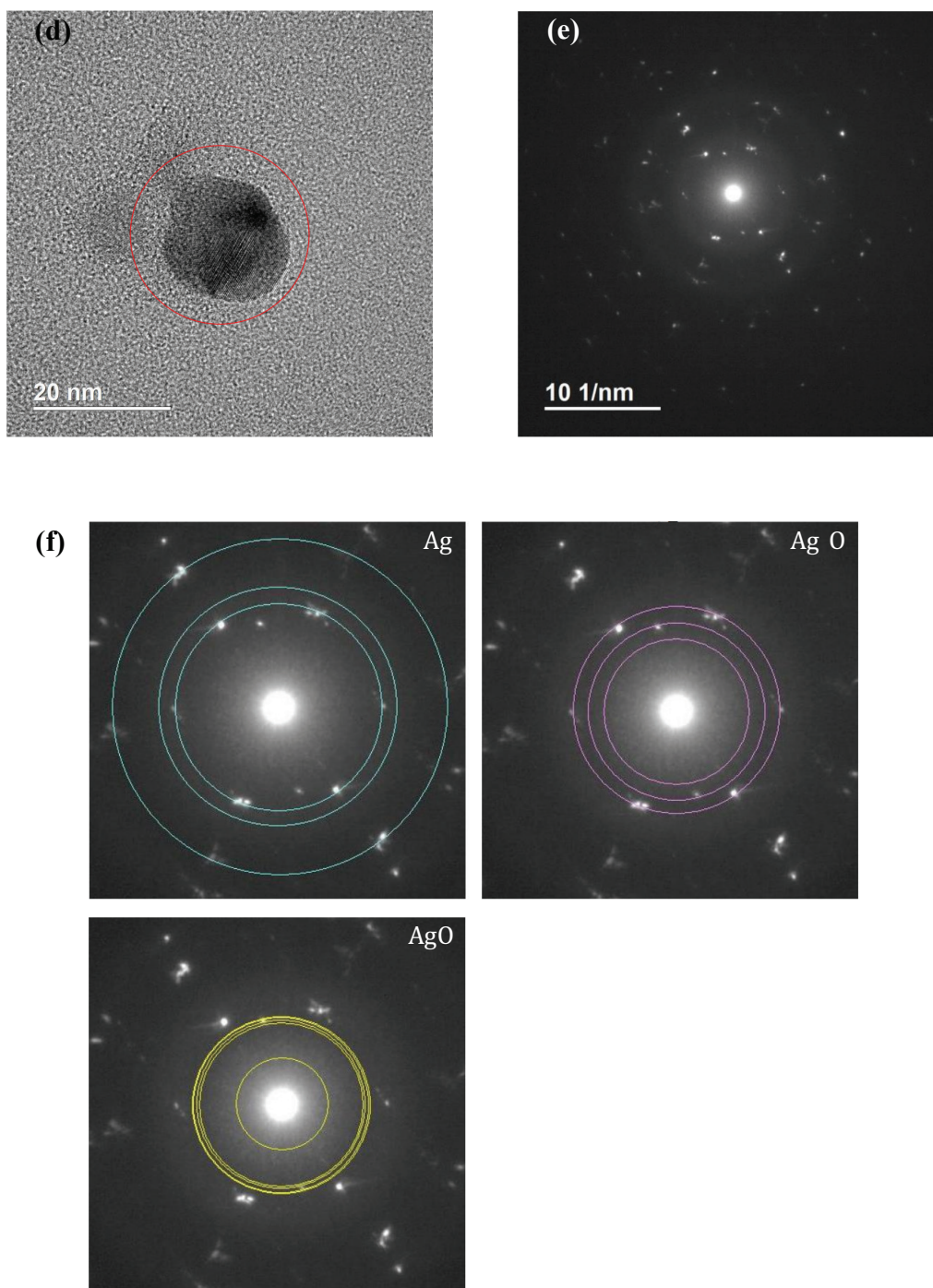


Figure S2. (d) TEM image of nanoparticles after AgO was added in the THF aqueous solution. (e) Electron beam diffraction patterns of (d) red circle. (f) Superimposition of electron beam diffraction patterns and calculated values (color rings) of Ag, Ag₂O, and AgO.