Supporting Information for:

**A New Method to Single-Crystal Micrometer-Sized
Ultra-Thin Silver Nanosheets: Synthesis and
Characterization**

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Content:

S1. Additional SEM, distribution Histograms, and TEM images of Ag Nanosheets

S2. SEM images of the irregular-shaped particles and broken specieces

S3. Energy dispersive spectrum (EDS) of Ag nanosheets

S4. SEM images of the polyhedral Ag crystals with paraffin liquid

S5. SEM images of the thick submicrosheets with only oleylamine (without hexane)

S6. UV-Vis-NIR absorption spectra of Ag nanosheets in hexane measured in quartz cuvette

S7. Additional optical microscope images of Ag nanosheets dispersed on a glass slide

Scheme S1. Illustrating the Formation of Single-crystal Silver Nanosheets.

Figure S1. (a, b) Additional SEM, (c) distribution histograms of the silver species (irregular-shpaed particles, triangular, truncated triangular, hexagonal, and dodecahedral) with more than 100 particles calculated, (c) edge distribution histograms of the regular nanosheets (triangular, truncated triangular, hexagonal, and dodecahedral) with more than 100 nanosheets calculated, and (e, f) TEM images of Ag nanosheets.

Figure S2. (a, b) detaild SEM images of the micrometer-sized thin nanosheets. The blue cycles marked the irregular shaped particle with sizes range from 200 nm to 800 nm. The red rectangular marked the broken species from the truncated triangular and hexagonal nanosheets.

Image Name: Base(3)

Accelerating Voltage: 15.0 kV

Magnification: 4000

Full scale counts: 497

Base(3)_pt1

Figure S3. Additional EDS pattern of Ag nanosheets.

Figure S4. SEM images of the polyhedral Ag crystals with paraffin liquid (a long chain alkane mixture of C18-C22) instead of hexane (C6), while keep the other experiments parameters the same as the synthesized of Ag nanosheets. Please note that a small amount of pentagons have been obtained.

Figure S5. SEM images of the thick submicrosheets with only oleylamine (without hexane) as the solvent while keep the other experiments parameters the same as the synthesized of Ag nanosheets.

Figure S6. (a) UV-Vis-NIR absorption spectra measured at room temperature: Curve 1, hexane control sample; Curve 2, Ag nanosheets dispersed in hexane with a low concentration measured in quartz cuvette (Sterna Cells, Inc, Catalog Number, 23-Q-10 with transparency in the range of 190-2700 nm); Curve 3, Ag nanosheets dispersed in hexane with a higher concentration measured in the same quartz cuvette. The cycles indicated the essential absorbance of the hexane in the NIR range.

Scheme S7. Optical microscope image of Ag nanosheets dispersed on a glass slide with oil-immersed *100X* objective.

Scheme S1. Schematic Diagram Illustrating the Formation of Single-crystal Silver Nanosheets with Regular Triangular, Truncated Triangular, Hexagonal, and Truncated Hexagonal Shapes: (1) the small nanosheets will continue to grow mainly along the $\langle 110 \rangle$ direction, within the $\{111\}$ planes, by Ag atomic attachment, forming larger nanosheets. (2) The high energy corners could be broken to form truncated triangular or truncated hexagonal nanosheets.