

## Supplementary material

# Evolution of WSe<sub>2</sub> Flakes Synthesized by Thermally Assisted Conversion Method

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The XPS analysis was performed using a Kratos AXIS Supra spectrometer with a non-monochromatic Al X-ray source under vacuum ( $< 10^{-8}$  Pa). The acquired photoelectron spectra were additionally processed using background signal subtraction and fitting procedures routines of the XPSPEAK41 software package.

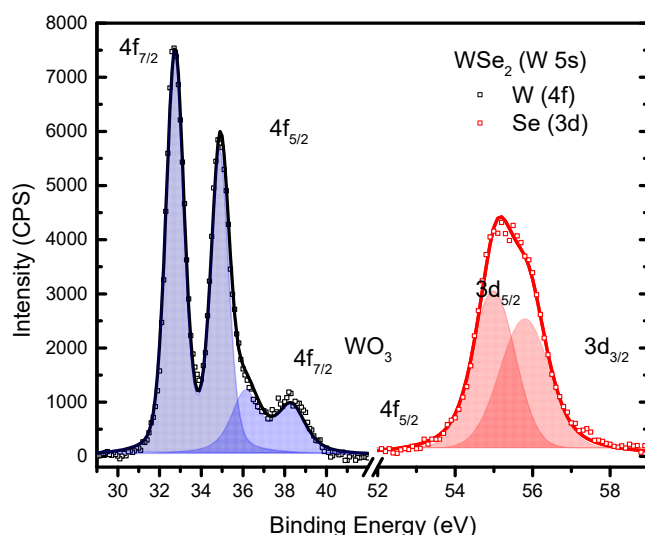


Figure S1. Peak-fitted XPS spectra after subtraction of a Shirley background of the W 4f and Se 3d core-levels of WSe<sub>2</sub> layer synthesized by TAC method (5 s pre-deposition time of W on Si/SiO<sub>2</sub>)

It is observed, according to the XPS spectra, that most of the W metal is bound to selenium, which is shown as the large doublet (blue) at ~33 eV with some residual oxides present. The atomic ratio Se/W was estimated by comparing the area under the fitted W 4f<sub>7/2</sub> and the Se 3d<sub>5/2</sub> peaks. The atomic ratio was found to be around ~ 1.85.