Supporting material for

Synthesis of a Family of $\{[(VSe_2)_n]_{1.06}(TaSe_2)_m\}_z$ Compounds

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Total 57 $\{[(\text{VSe}_2)_n]_{1.06}(\text{TaSe}_2)_m\}_z$ superlattices were prepared where n and m varied from 1 to 4. For most of the first 16 superlattices, we present both a Rietveld refinement of the structure along the z -axis and a graph showing the diffraction patterns of the other samples prepared with the same nominal structure. A schematic structure is shown below the refinement containing both intra- and inter-plane distances. The structure in ab -plane has not been refined. The last figure is refinement result of $\{[(\text{VSe}_2)_3]_{1.06}(\text{TaSe}_2)_4\}_{10}$ superlattice using data collected below Ta L_3 adsorption edge energy (9.679KeV).

Goodness of fit $\chi^2 = 14.33$, Fitted Residual = 13.58%, Background Residual = 11.61%

Goodness of fit $\chi^2 = 15.69$, Fitted Residual = 15.21%, Background Residual = 12.28%

Goodness of fit $\chi^2 = 17.18$, Fitted Residual = 14.84%, Background Residual = 13.95%

Goodness of fit $\chi^2 = 40.23$, Fitted Residual = 22.81%, Background Residual = 22.47%

Goodness of fit $\chi^2 = 4.55$, Fitted Residual = 12.10%, Background Residual = 10.26%

Goodness of fit $\chi^2 = 4.93$, Fitted Residual = 10.20%, Background Residual = 9.60%

Goodness of fit $\chi^2 = 5.18$, Fitted Residual = 10.14%, Background Residual = 9.35%

Goodness of fit $\chi^2 = 2.55$, Fitted Residual = 6.83%, Background Residual = 5.86%

Goodness of fit $\chi^2 = 20.02$, Fitted Residual = 12.55%, Background Residual = 11.95%

Goodness of fit $\chi^2 = 4.48$, Fitted Residual = 10.96%, Background Residual = 9.51%

GSAS refinement result. The data were collected at Advance Photon Source (Argonne National Laboratory) using below Tantalum L_3 absorption edge energy (9.679KeV).