

Supporting Information

Highly Oriented GeSe Thin Film: Self-Assembly Growth via the Sandwiching Post-Annealing Treatment and Its Solar Cell Performance

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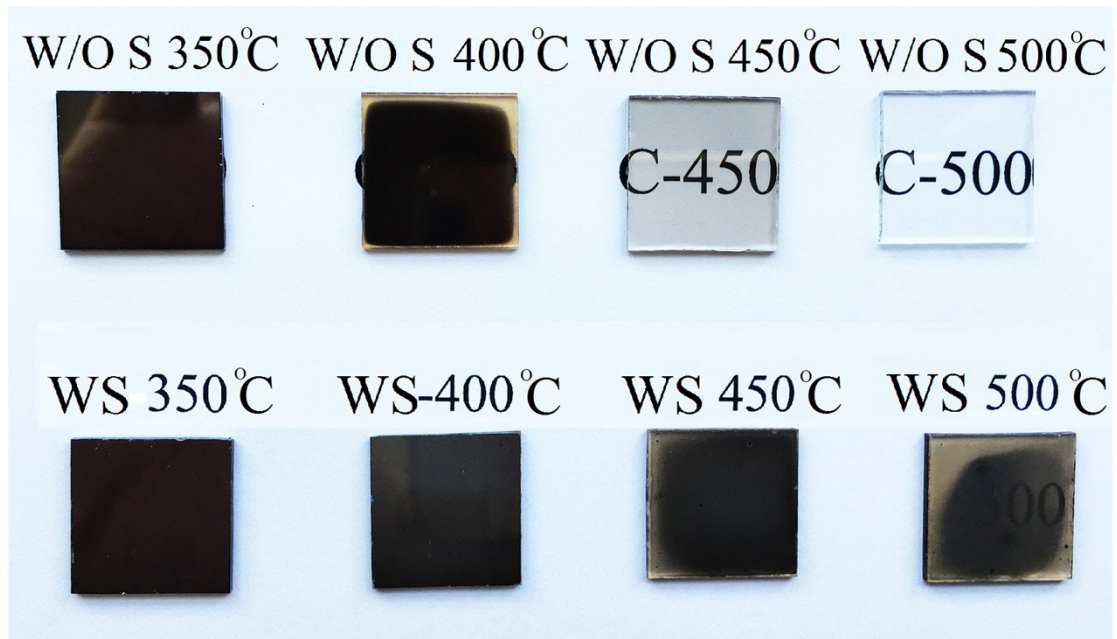


Figure S1. The photographs of GeSe samples annealed without sandwiching treatment and with sandwiching treatment at the temperatures of 350 °C ~ 500 °C.

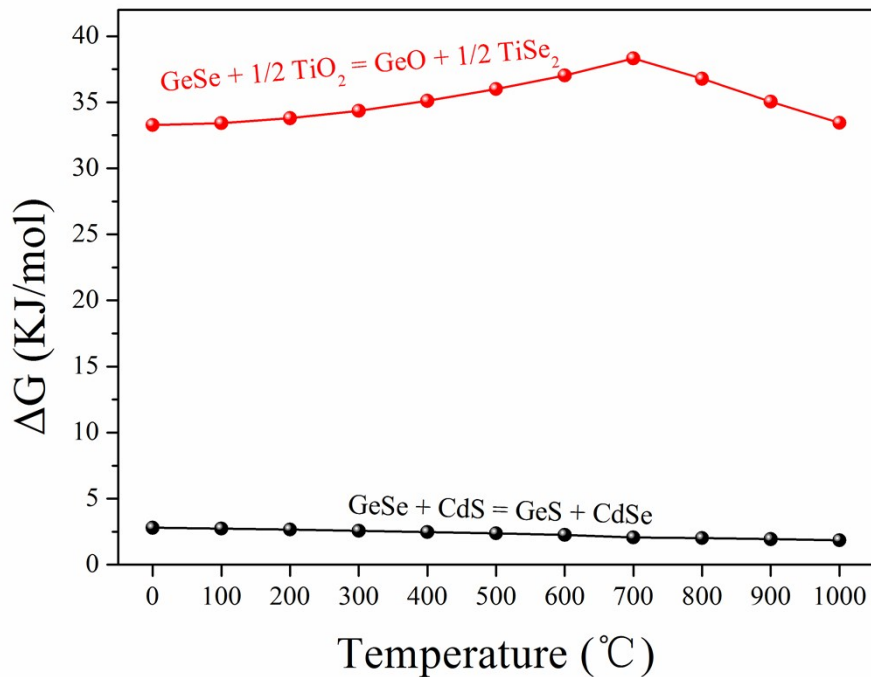


Figure S2. The Gibbs free energy (ΔG) of the possible interfacial reaction: $\text{GeSe} + 1/2\text{TiO}_2 = \text{GeO} + 1/2\text{TiSe}$ and $\text{GeSe} + \text{CdS} = \text{GeS} + \text{CdSe}$. It can be easily found in the Figure S2 that the Gibbs free energy of GeSe/TiO₂ interface is always larger than the one of GeSe/TiO₂ interface over the range of temperatures 0 ~ 1000 °C, which indicates that TiO₂ is less likely to react with GeSe.

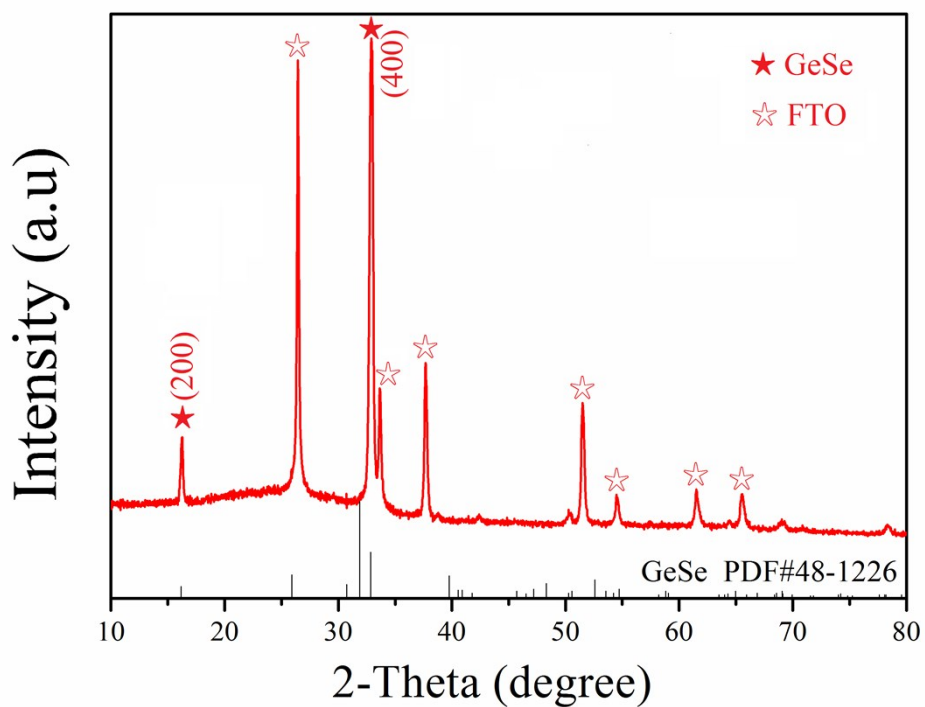


Figure S3. The XRD patterns of GeSe thin film deposited on FTO/TiO₂ and annealed with sandwiching treatment at the temperature of 450 °C. The XRD patterns of GeSe thin film also matched GeSe orthorhombic phase (JCPDS#48-1226) well. Similar to SLG substrate, the GeSe thin film deposited on FTO/TiO₂ also exhibited highly preferred orientations along the planes of (200) and (400).

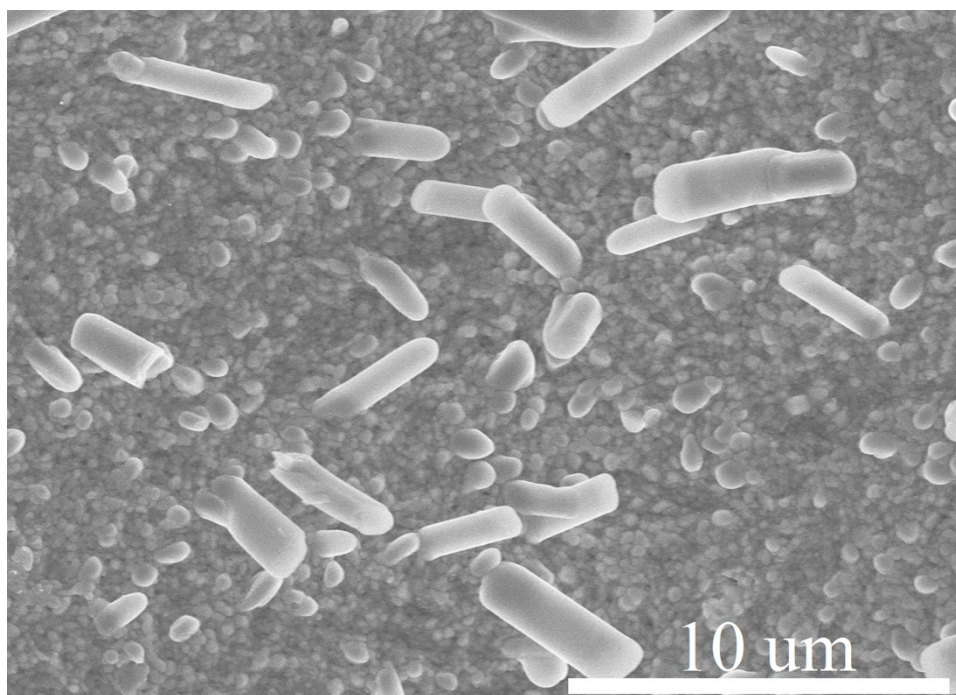


Figure S4. The SEM image of the GeSe film deposited on FTO/TiO₂ and annealed with sandwiching treatment at the temperature of 450 °C.