Facile *In-situ* Solution Synthesis of SnSe/rGO Nanocomposites with Enhanced Thermoelectric Performance†; Su*pporting Information.*

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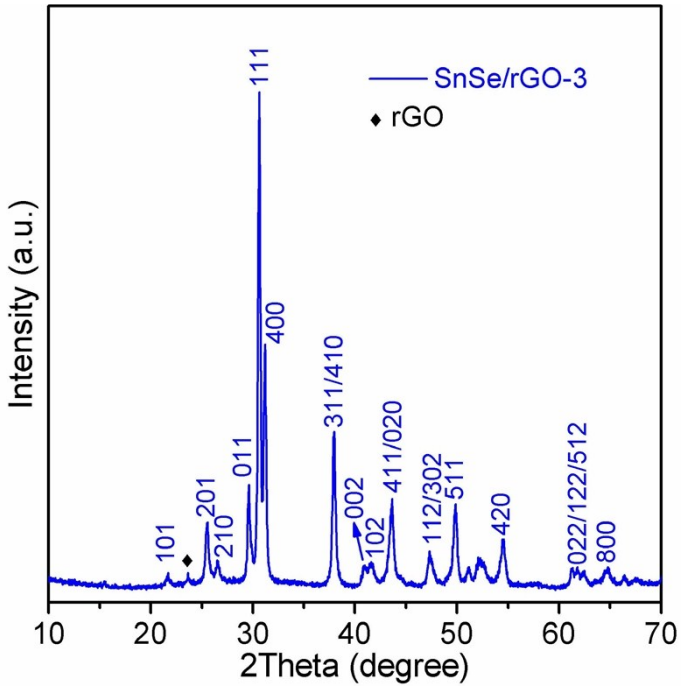

Fig. S1 XRD pattern of the SnSe/rGO-3 nanocomposite.

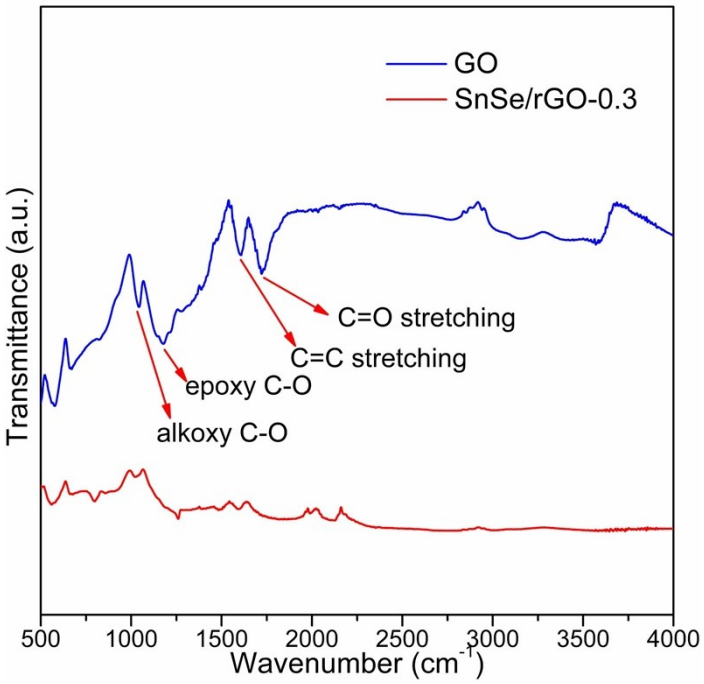

Fig. S2 FTIR spectra of GO and SnSe/rGO-0.3 nanocomposite.

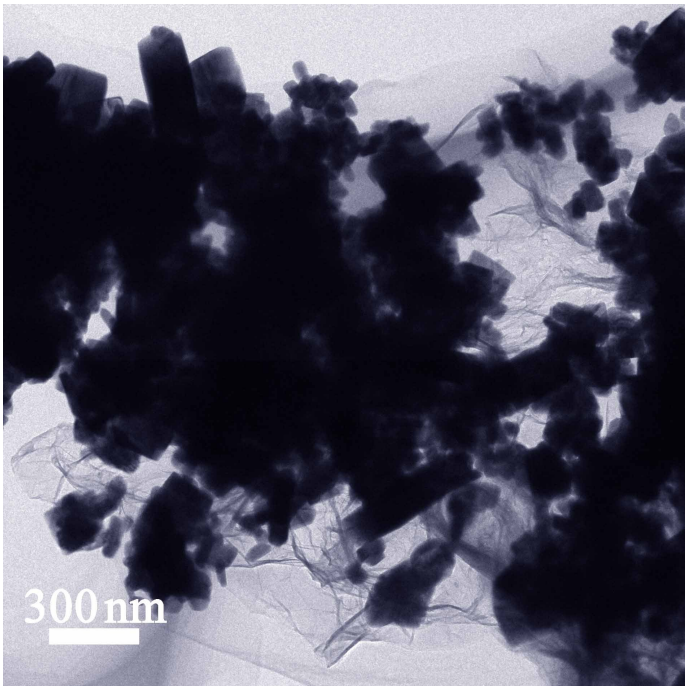

Fig. S3 TEM image of the SnSe/rGO-0.3 nanocomposite.

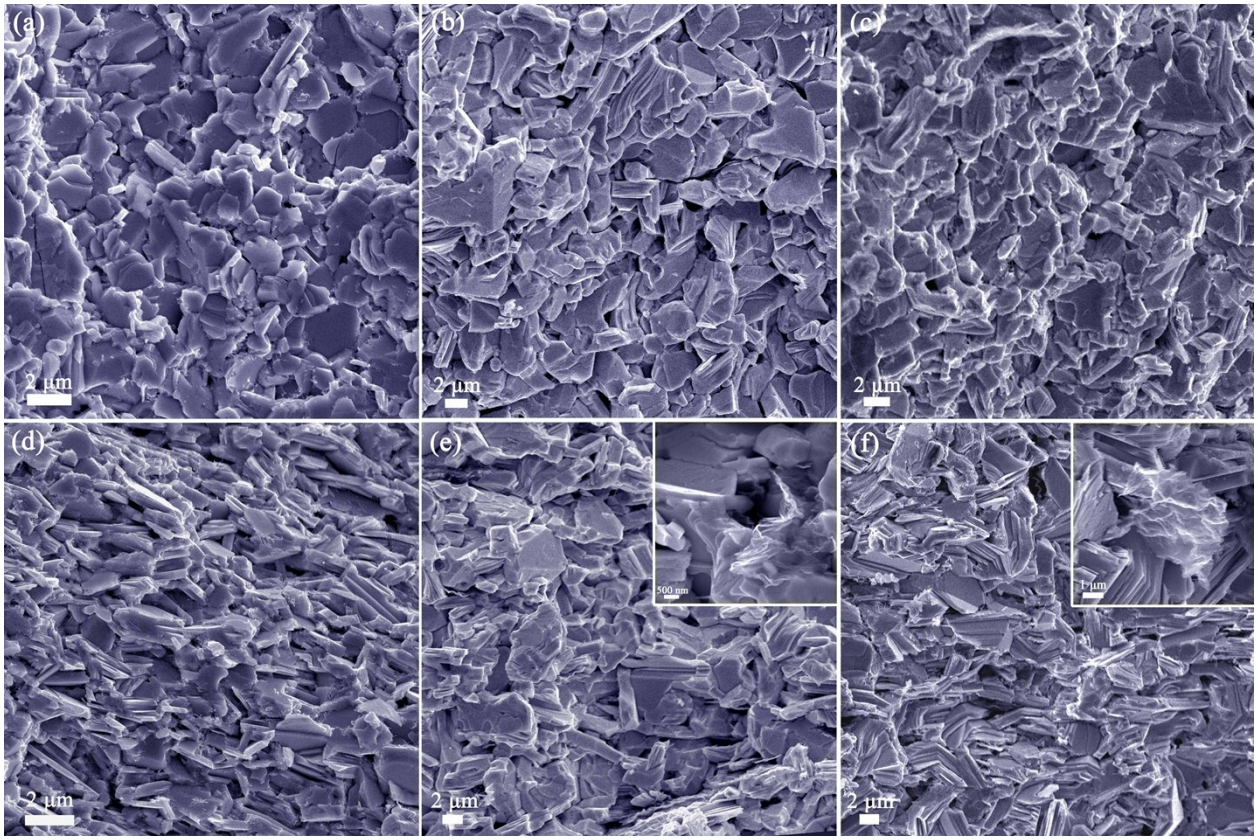

Fig. S4 Cross-sectional SEM images collected from fractured pellets (a-c) perpendicular and (d-f) parallel to the pressing direction for the sintered SnSe/rGO-x pellets: (a, d) x = 0.1 wt%, (b, e) x = 0.5 wt%, (e, f) x = 0.7 wt%. The insets in (e) and (f) are magnified SEM images showing the coexistence of SnSe plates and rGO wrinkled sheets.

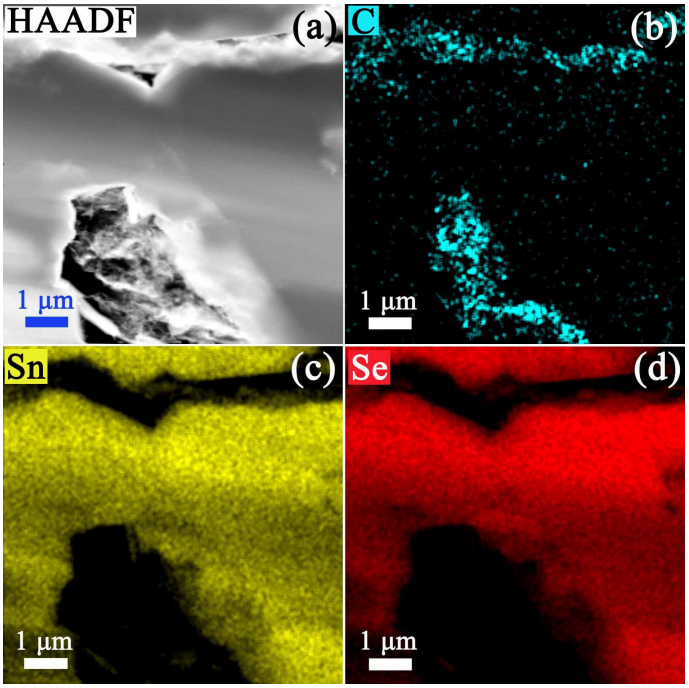

Fig. S5 STEM-EDS characterisation of the SnSe/rGO-0.3 pellet: (a) HAADF-STEM image, (b-d) the corresponding elemental maps of C (cyan), Sn (yellow) and Se (red).

Table S1 Chemical composition of the solution-synthesised single-phase SnSe nanoplates

Measurement technique	Sn (at %)	Se (at %)
EDS	49 ± 1	51 ± 1
ICP-OES	50.5 ± 0.5	49.5 ± 0.5

We characterised the composition of the solution-synthesised SnSe nanoplates using several different methods. First, we determined the elemental composition using energy dispersive X-ray spectroscopy in the scanning electron microscope. From a combination of a series of point scans and area scans, we were able to determine an Sn:Se ratio of (49±1):(51±1). The chemical composition could be obtained with an even higher level of precision *via* inductively coupled plasma optical emission spectrometry (ICP-OES), which gave an Sn:Se atomic ratio of (50.5±0.5):(49.5±0.5). Both of these results indicate that the Sn:Se ratio is 1:1 within experimental error. Given that sintered pellets of our SnSe samples have a Hall carrier concentration (3.9×10^{18} cm^{-3}) that is relatively high compared to that from SnSe synthesised by high-temperature melting and annealing (which is typically of the order of 10^{17} cm^{-3})[1], it is nevertheless possible that a small concentration of Sn vacancies could exist in our SnSe samples.

Reference:

1. C. L. Chen, H. Wang, Y. Y. Chen, T. Day and G. J. Snyder, *J. Mater. Chem. A*, 2014, 2, 11171-11176.