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Supporting Information

Telluride-Based Nanorods and Nanosheets: Synthesis, Evolution and Properties

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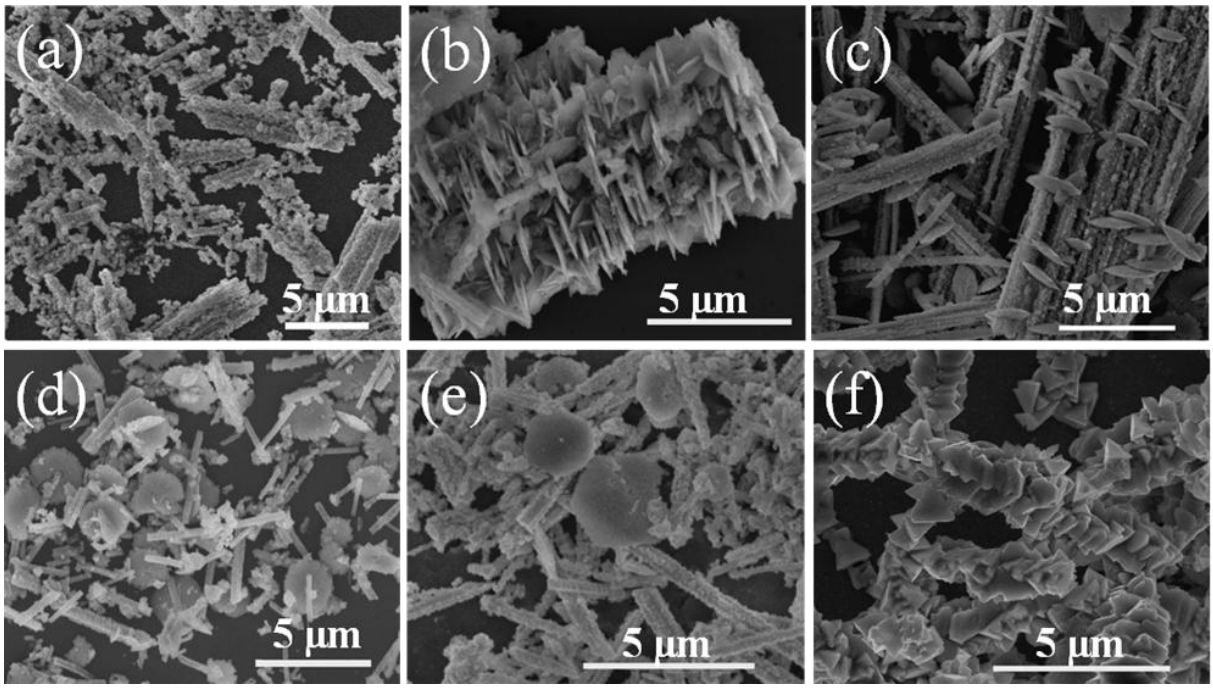

Figure S1. FESEM image (a) without PVP or CTAB, (b) PVP: CTAB with 1:0 weight ratio, (c) PVP: CTAB with 1:1 weight ratio, (d) PVP: CTAB with 1:5 weight ratio,(e) PVP: CTAB with 1:10 weight ratio, and (f) represent PVP: CTAB of with 0:1 weight ratio.

To confirm the presence of PVP is crucial for synthesis of In_2Te_3 nanoplates, we performed reaction without PVP and also replacing PVP with another surfactant CTAB. The products are obtained with

different PVP and CTAB weight ratio (PVP: CTAB, 0:1, 1:1, 1:5, 1:10 and 1:0 respectively) as shown in figure S1.The FESEM image in figure S1 (a) shows that without surfactant we get nanoparticle assisted nanorods of In_2Te_3. The addition of PVP gives nanostring-cluster hierarchical structure of In_2Te_3 nanosheets as shown in figure S1 (b). When we added equivalent weight of CTAB of PVP (1:1 ratio), the obtained hierarchical nanostructure contain nano-prism on rod along with nanosheets as shown in figure S (c). The presence of CTAB is favorable for the triangular orientation growth of In_2Te_3 nanoparticles. [9]. Further increase in weight ratio of CTAB with PVP (1:5 and 1:10) provide more prism like nanostructure on nanorod and few nanosheet observed as shown in figure S (c) and (d). The decrease in number of nanosheets with increasing amount of CTAB comparatively to amount of PVP proves that In_2Te_3 nanosheet growth is due to caping ligand PVP. The figure S1 (f) confirmed that PVP play a vital role for In_2Te_3 nanosheets growth as there was not a single nanosheets observed in the absence of PVP (PVP: CTAB = 0:1), and only nano-prism obtained.

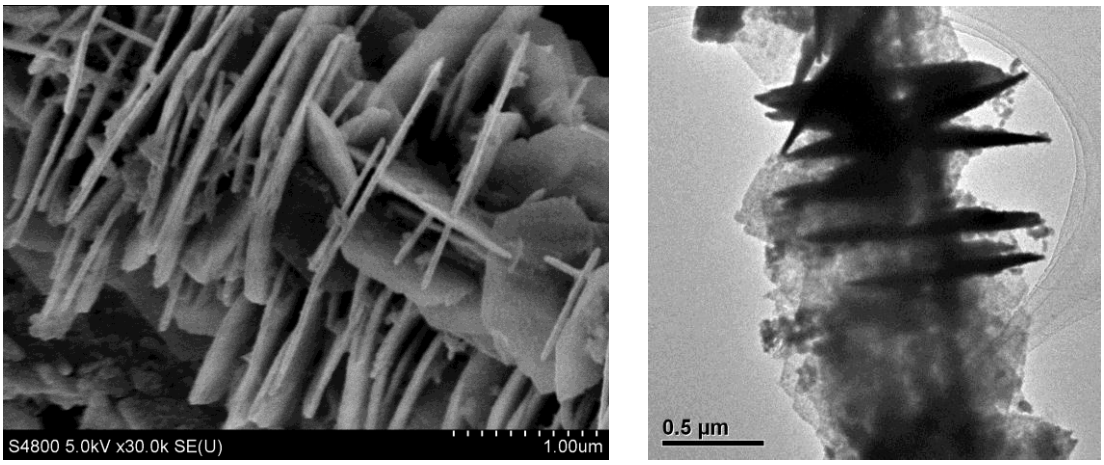

Figure S2. Side-view SEM (left) and TEM (right) images of the In_2Te_3

A proposed reaction for In_2Te_3 nanosheets is given below;

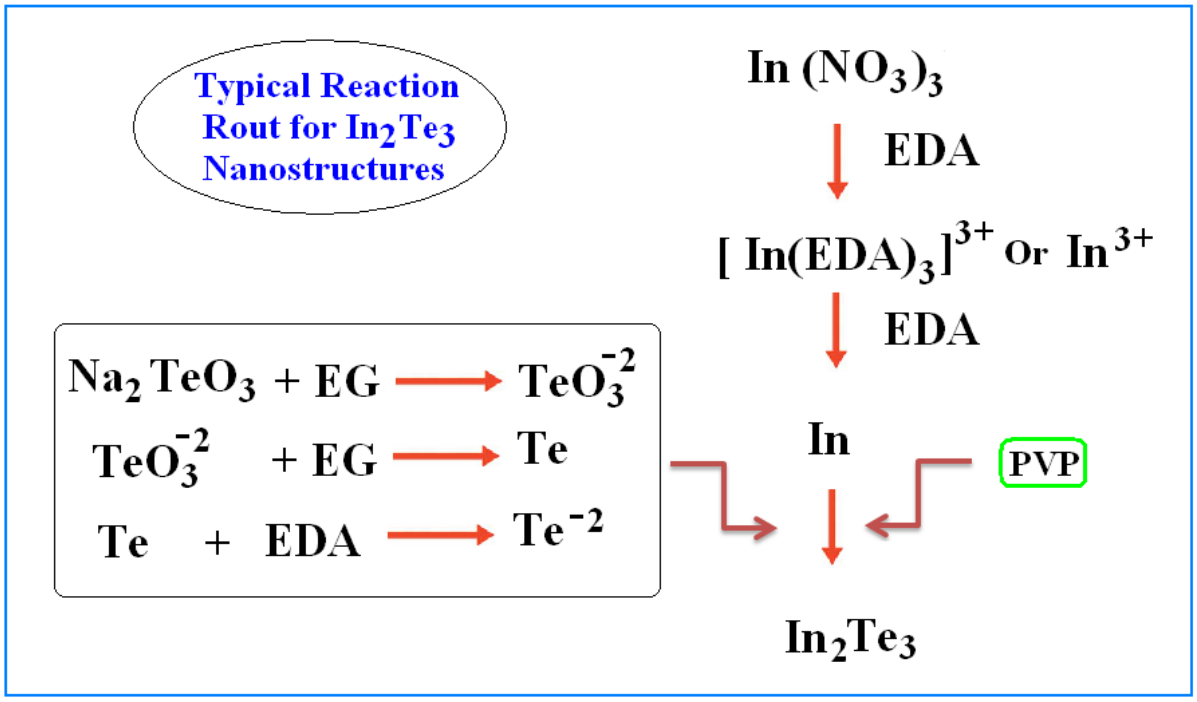

Table S 1: Comparison of hydrogen absorption of In_2Te_3 nanosheets with different other semiconductor materials.

Material	Absorption /wt%	Pressure MPa	Temp /K	Tested wt/g	Reference
In_2Te_3 nanosheets	1.34	5	373	0.2	present work
In_2Te_3-Te nanosheets-nanowires	0.41	5	373	0.2	present work
Te nanowires	0.33	5	373	0.2	present work
$MmNi_{4.6}Al_{0.4}$	1.30	0.2	398	-	13
Zn_3N_2 hollow structure	1.29	7.5	373	0.3	13
Microporous carbon	1.26	5	373	0.3	14
MoS_2 nanotubes	1.2	3	398	0.5	14
ZnO microsphere	1.178	5	373	0.3	15
ZnO nanowires	0.83	5	373	0.3	15
BN nanotube	2.6	10	398	0.1	13