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One-Step Solvothermal Synthesis of Bi_2Te_3 Single Crystal Nanosheets with Uniform Morphology

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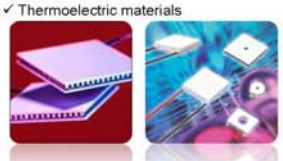
Introduction

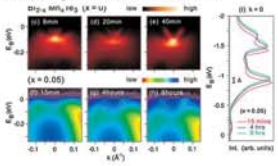
◆ **Bismuth telluride**

Bismuth telluride	
Identifiers	
CAS number	1304-82-1
ChemSpider	11278908
Jmol-3D images	Image 1
SMILES	[show]
InChI	[show]
Properties	
Molecular formula	Bi_2Te_3
Molar mass	800.761 g/mol
Appearance	grey powder
Density	7.7 g/cm^3
Melting point	585 C[*]
Structure	
Crystal structure	Trigonal, hR15, SpaceGroup = R-3m, No. 166

✓ Thermoelectric materials



✓Topological-Insulator materials



Experimental

Results & Discussion

☐ Phase analysis and SEM characterization

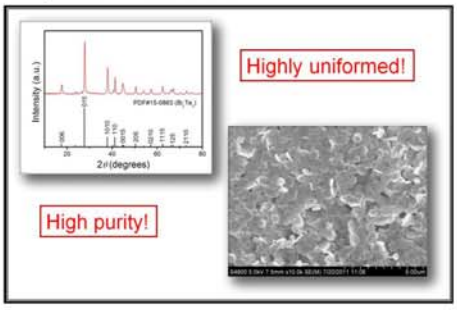


Fig.1 X-ray diffraction and SEM image of Bi_2Te_3 nanosheets

☐ HRTEM characterization and SAED analysis

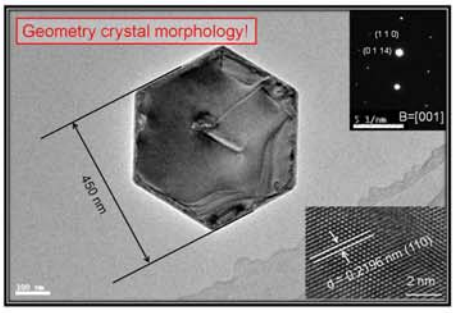


Fig.2 SAED and HRTEM image of Bi_2Te_3 nanosheets

☐ Analysis of reaction mechanism

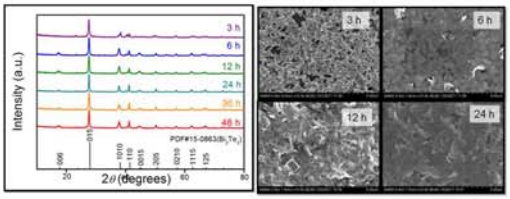
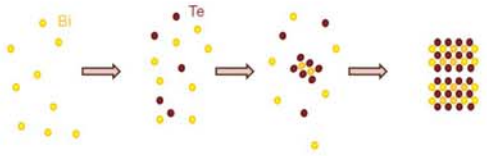


Fig.3 X-ray diffractions and SEM images of Bi_2Te_3 nanosheets with a series of reaction time



☐ Importance of the alkaline environment

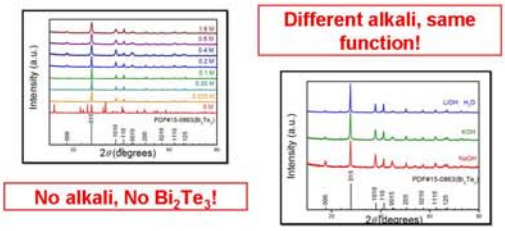


Fig.3 X-ray diffractions of Bi_2Te_3 nanosheets with a series of concentration of alkali, and different kind of alkali

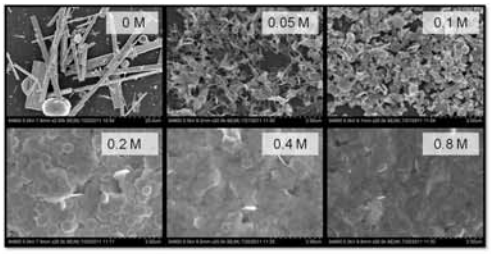


Fig.4 SEM images of Bi_2Te_3 nanosheets with a series of concentration of alkali

Conclusions

☐Hexagonal nanosheet of Bi_2Te_3 single crystals with uniform morphology were conveniently synthesized through a solvothermal route at low temperature (180 °C).

☐In this solvothermal process, the alkaline environment plays an important role in the formation of Bi2Te3 single crystals, and the thickness of Bi_2Te_3 nanosheets can be controlled by using different concentration of alkali.

Acknowledgements

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