

Electronic Supplementary Information

Synthesis of Colloidal $\text{MnAs}_x\text{Sb}_{1-x}$ Nanoparticles: Compositional Inhomogeneity and Magnetic Consequences

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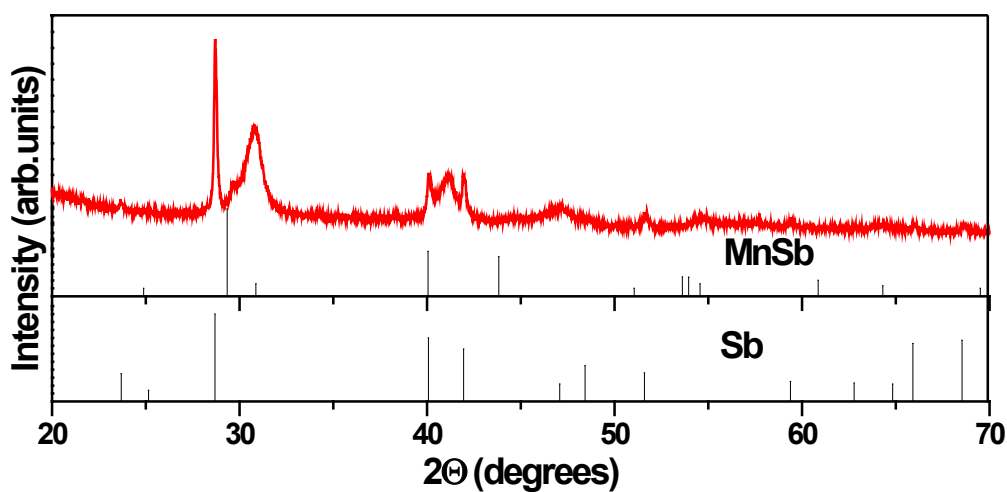


Fig. S1: PXRD pattern of initial synthesis of $\text{MnAs}_{0.5}\text{Sb}_{0.5}$ nanoparticles (target composition) using 1.1 mmol of Mn and heating the reaction mixture at 250 °C for 3 h (MnSb-PDF#-03-065-0388, Sb-PDF#-00-035-0732)

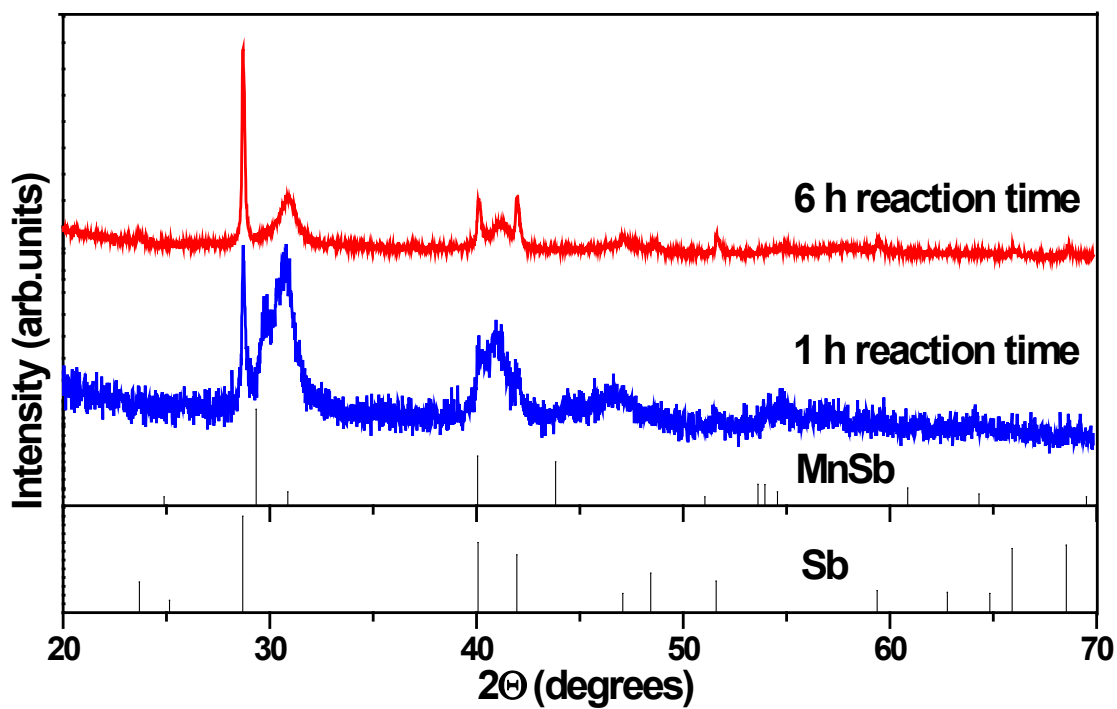


Fig. S2: PXRD patterns of the syntheses showing the effect of reaction time when heated at 250 °C in the presence of 1.1 mmol of Mn . (MnSb-PDF#-03-065-0388, Sb-PDF#-00-035-0732)

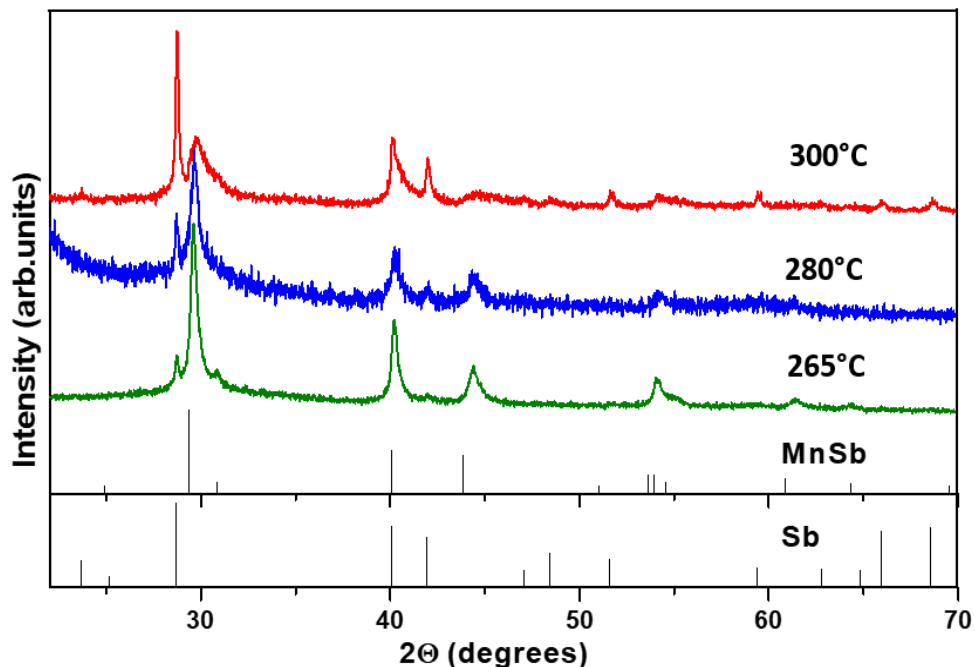


Fig. S3: PXRD patterns of the syntheses showing the effect of reaction temperature towards the $\text{MnAs}_{0.5}\text{Sb}_{0.5}$ nanoparticles (target composition) synthesis in the presence of 1.1 mmol of Mn and heated for 3 h (MnSb-PDF#-03-065-0388, Sb-PDF#-00-035-0732)

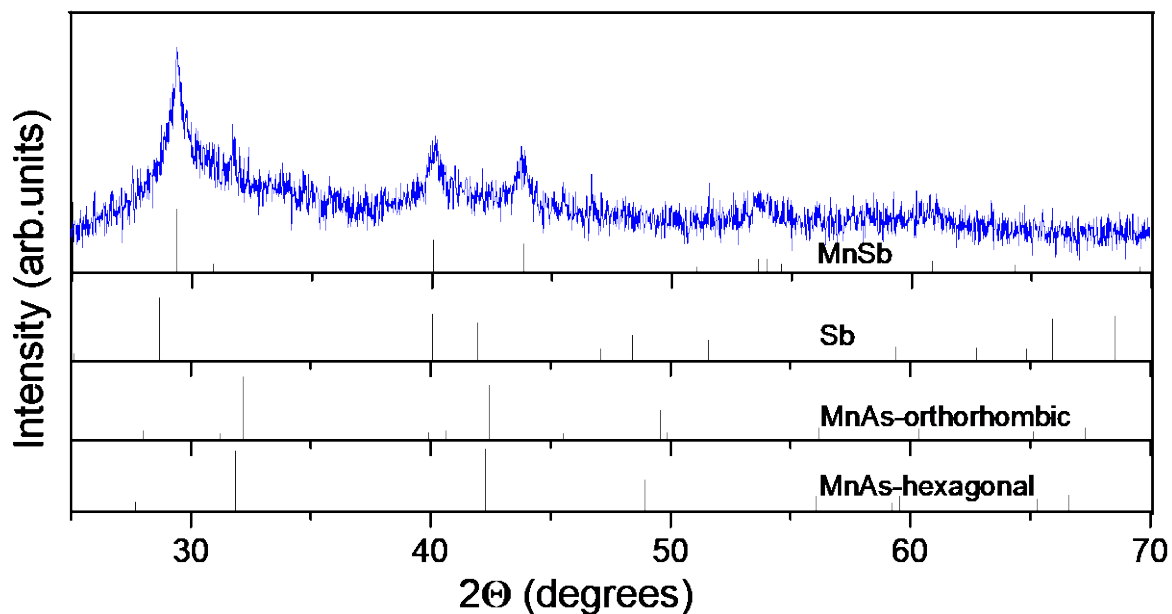


Fig. S4: PXRD pattern of the synthesis in the presence of NaBH_4 showing the phase segregation in composition $\text{MnAs}_{0.5}\text{Sb}_{0.5}$ nanoparticles (target composition) (MnSb-PDF#-03-065-0388, Sb-PDF#-00-035-0732, MnAs (hexagonal)- PDF#-00-028-0644, MnAs (orthorhombic)- PDF#-01-071-0923)

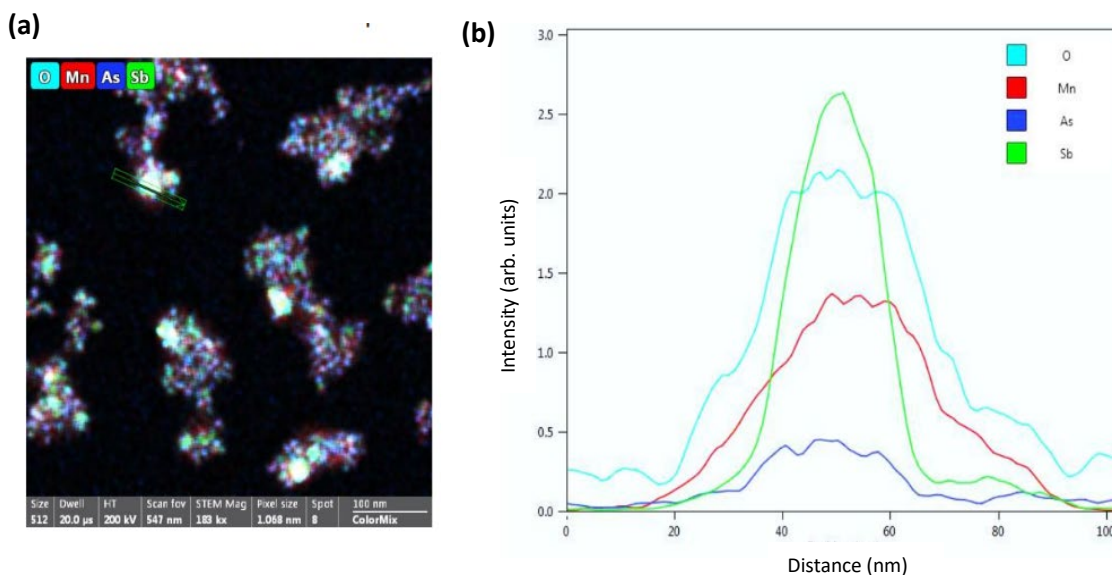


Fig. S5: (a) Elemental mapping analysis of nanoparticles of observed composition $\text{MnAs}_{0.48}\text{Sb}_{0.52}$. (targeted composition: $\text{MnAs}_{0.70}\text{Sb}_{0.30}$) (b) The line scan elemental analysis is obtained through a cluster of $\text{MnAs}_{0.48}\text{Sb}_{0.52}$ nanoparticles along the black line (upper left, **Fig S5a**). Color code: Mn (red), As (blue), Sb (green), and O (yellow)

Table S1: Paramagnetic slopes subtracted from raw data to produce data in **Fig. 11** according to Equations S1-S4.

-	-	Slope at 50 K	Slope at 300 K
Target composition	Actual composition	χ_{para} (emu/mol Mn)	χ_{para} (emu/mol Mn)
$\text{MnAs}_{0.1}\text{Sb}_{0.9}$	$\text{MnAs}_{0.03}\text{Sb}_{0.95}$	0.04679	0.02344
$\text{MnAs}_{0.2}\text{Sb}_{0.8}$	$\text{MnAs}_{0.08}\text{Sb}_{0.92}$	0.06085	0.03226
$\text{MnAs}_{0.3}\text{Sb}_{0.7}$	$\text{MnAs}_{0.12}\text{Sb}_{0.88}$	0.03571	0.01060
$\text{MnAs}_{0.5}\text{Sb}_{0.5}$	$\text{MnAs}_{0.31}\text{Sb}_{0.69}$	0.06246	0.03187
$\text{MnAs}_{0.7}\text{Sb}_{0.3}$	$\text{MnAs}_{0.52}\text{Sb}_{0.48}$	0.04871	0.01797
$\text{MnAs}_{0.8}\text{Sb}_{0.2}$	$\text{MnAs}_{0.48}\text{Sb}_{0.52}$	0.03341	0.01322
$\text{MnAs}_{0.9}\text{Sb}_{0.1}$	$\text{MnAs}_{0.85}\text{Sb}_{0.15}$	0.09683	0.02952

Eq S1: $M_{\text{total}} = M_{\text{para}} + M_{\text{ferro}}$

Eq S2: $M_{\text{total}} = \chi_{\text{para}}(H) + M_{\text{ferro}}$

Eq S3: $y = mx + b$; $m = \chi_{\text{para}}$

Eq S4: $M_{\text{ferro}} = M_{\text{total}} - \chi_{\text{para}}(H)$