Enhanced figure of merit in $Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$/multi wall carbon nanotube nanocomposites

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Supplementary information

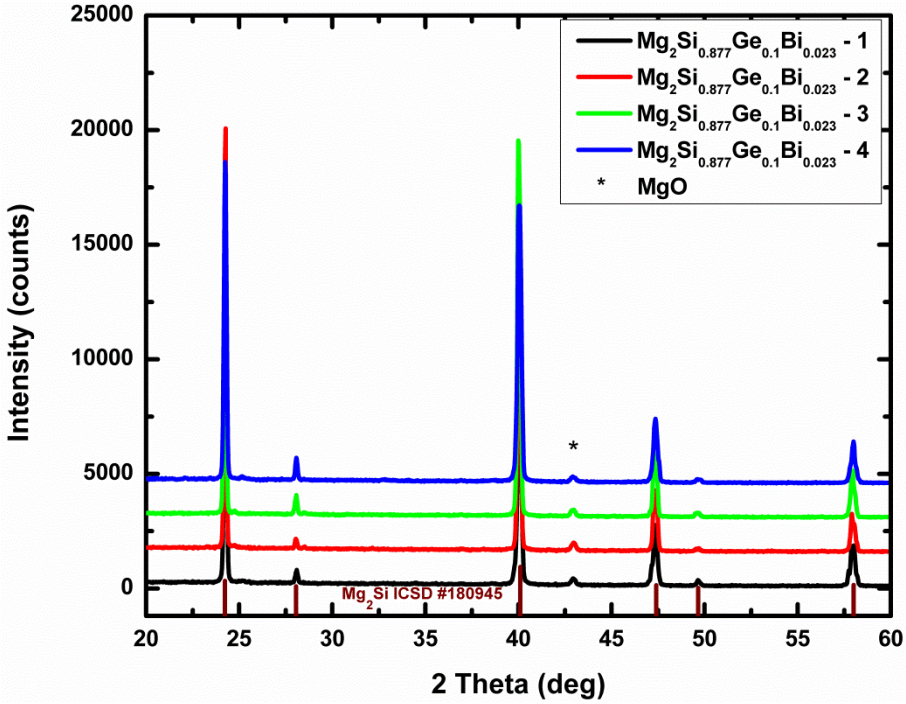

Fig. S1 Powder XRD patterns of $Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$ samples.

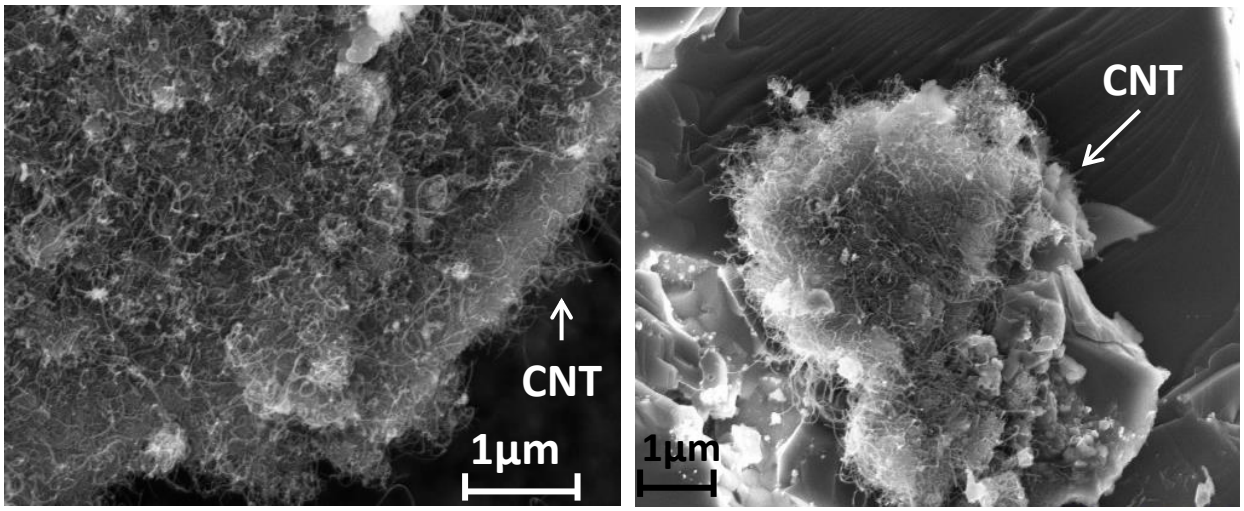

Fig. S2 SEM images of the $Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$/1 wt.-% MWCNT sample.

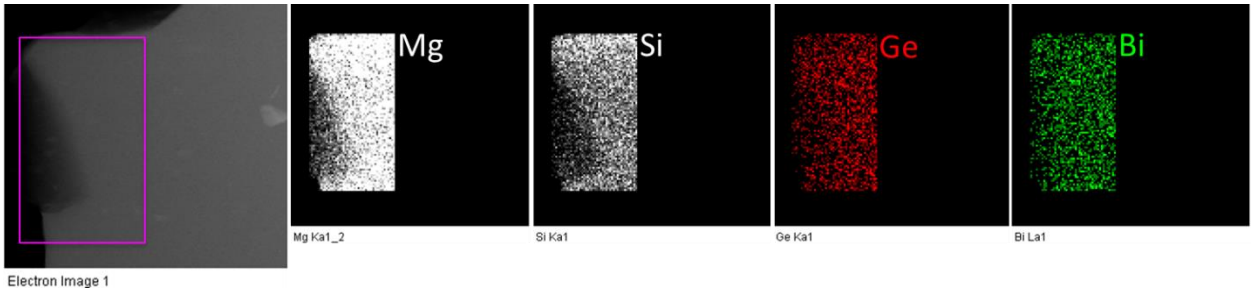

Fig. S3 Low-magnification structural (STEM-HAADF imaging) and compositional (EDX elemental mapping) analyses of a selected region within a grain. EDX elemental mapping shows the distribution of Mg, Si, Ge and Bi.

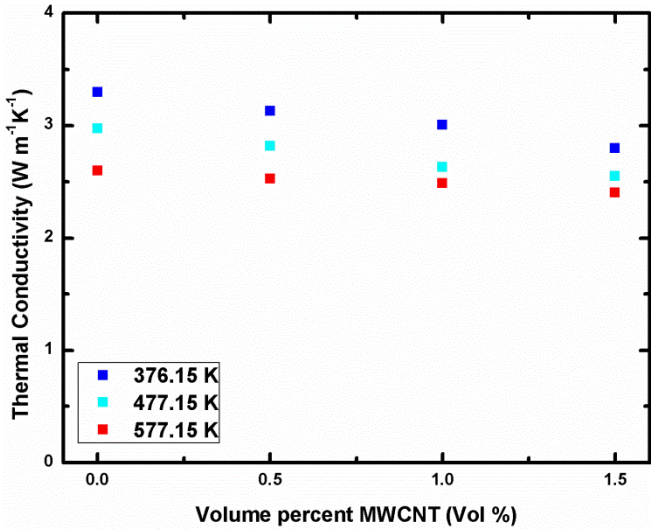

Fig. S4 Medium temperature thermal conductivity of all samples with respect to MWCNT content.

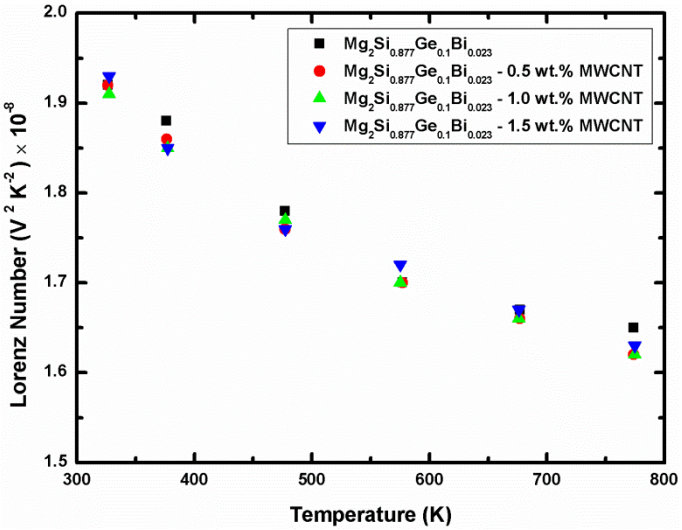

Fig. S5 Lorenz number of all samples with regard to temperature.

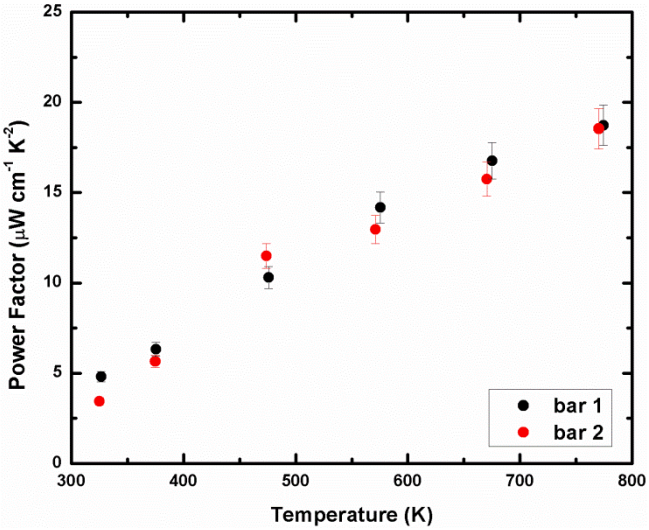

Fig. S6 Power factor of two bars obtained from 0.5% MWCNT/$Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$ nanocomposite (6% error is considered).

Table S1 Densities and specific heat of the $Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$/MWCNT samples.

Sample	Density ($g\ cm^{-3}$)	Relative density	C_p ($J\ g^{-1}K^{-1}$)
$Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$	2.10	96%	0.877
$Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$ - 0.5 wt.-% MWCNT	2.10	96%	0.882
$Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$ - 1.0 wt.-% MWCNT	2.04	93%	0.888
$Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$ - 1.5 wt.-% MWCNT	2.06	94%	0.894

Theoretical densities of the composite (d_C) were calculated using the mixture rule :

$$\frac{1}{d_C} = \frac{W_{MWCNT}}{d_{MWCNT}} + \frac{W_{Matrix}}{d_{Matrix}}$$

Where d_{MWCNT}, d_{Matrix}, W_{MWCNT} and W_{Matrix} are the densities and mass fractions of the nanotubes and $Mg_2Si_{0.877}Ge_{0.1}Bi_{0.023}$, respectively.