Supporting Information

Graphene as enhancer of the magnetoresistance in $FeNi_3$-graphene nanocomposites

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Figure S1. Field emission scanning electron microscopy (FESEM) of the **$FeNi_3$–G** nanocomposite.

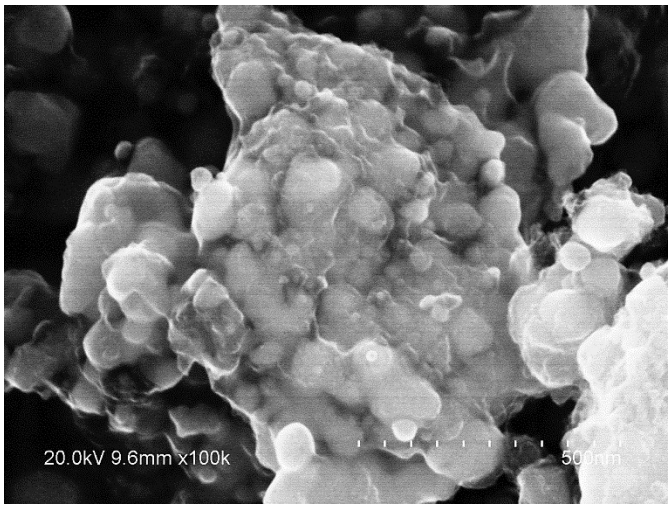


Figure S2. (A) XRD pattern of the **$FeNi_3$–NP** synthesized via solution reduction using hydrazine. (B) TEM image and (C) SAED pattern of the **$FeNi_3$–NP**.

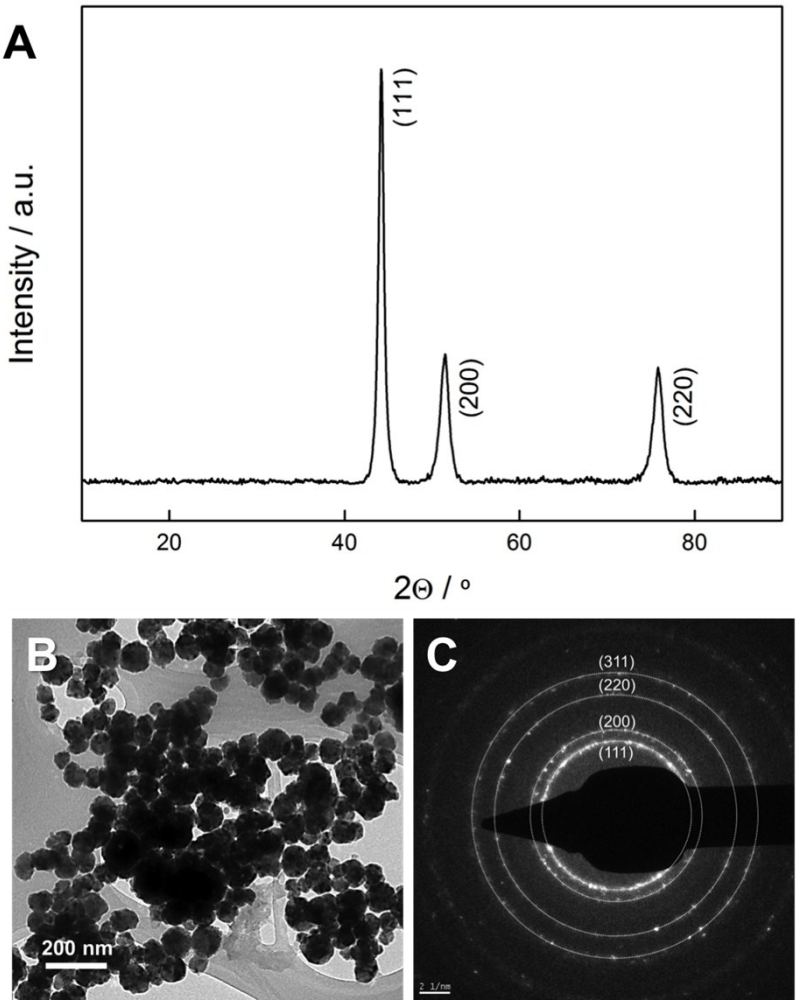
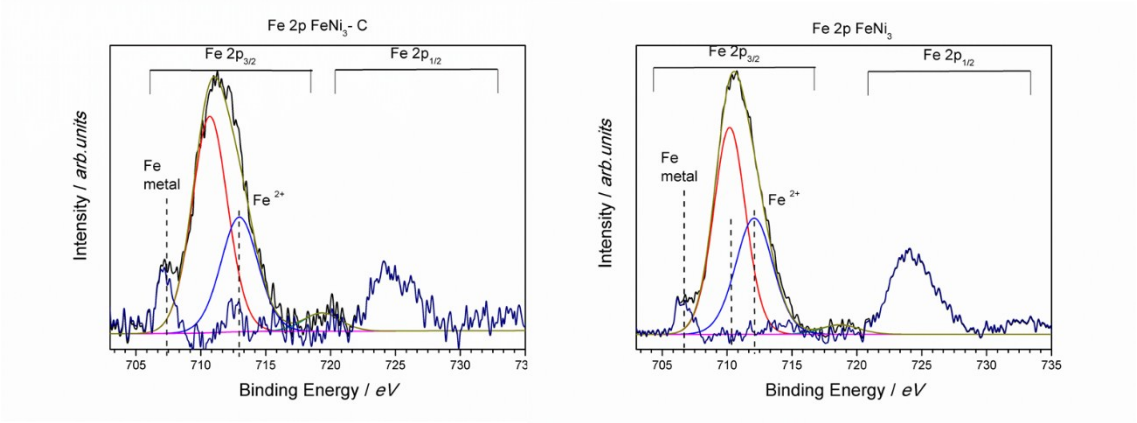


Figure S3. The Fe2p and the Ni 2p XPS spectra for the **$FeNi_3$–G** and the **$FeNi_3$–NP**.



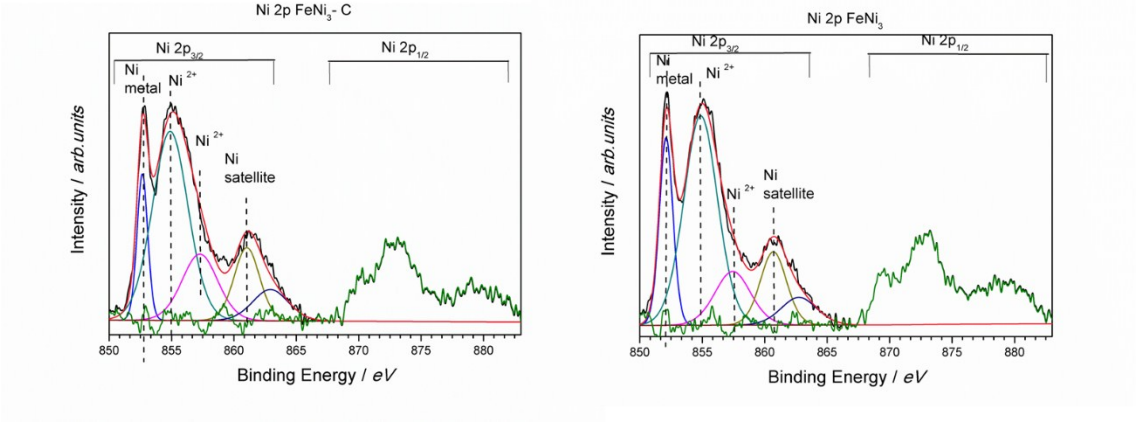


Figure. S4. O1s XPS spectra for the **$FeNi_3$–NP** and the **$FeNi_3$–G**.

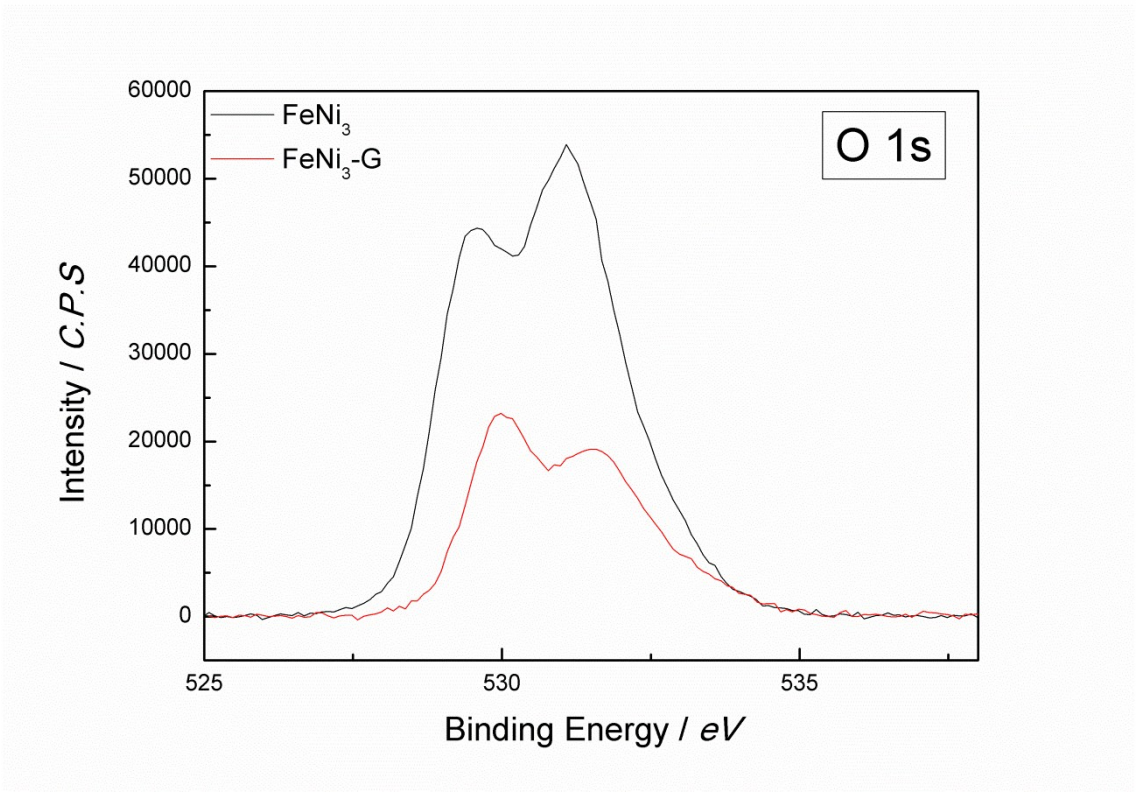


Figure S5. Hysteresis loops of the **$FeNi_3$–NP** at 2 K and 300 K. The inset shows the low-field area.

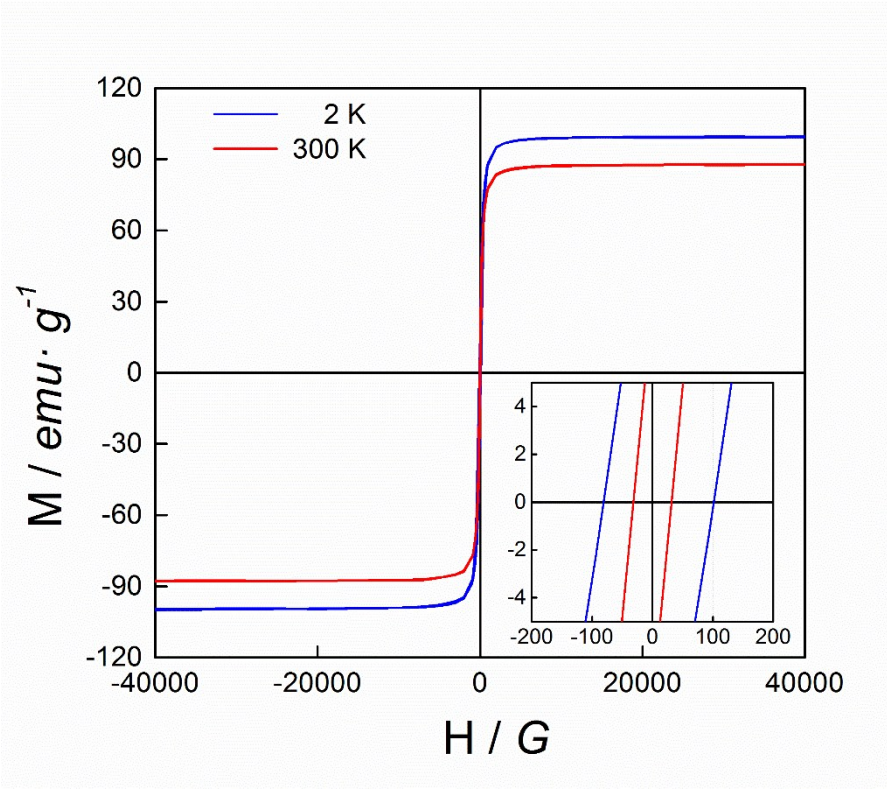
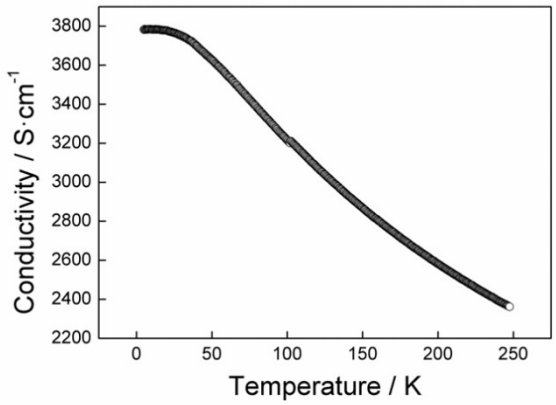


Figure S6. (A) The temperature dependence of resistivity obeys metallic behaviour. (B) *I*–*V* conductivity *vs*. voltage curves at different temperatures ranging from room temperature to 2 K.



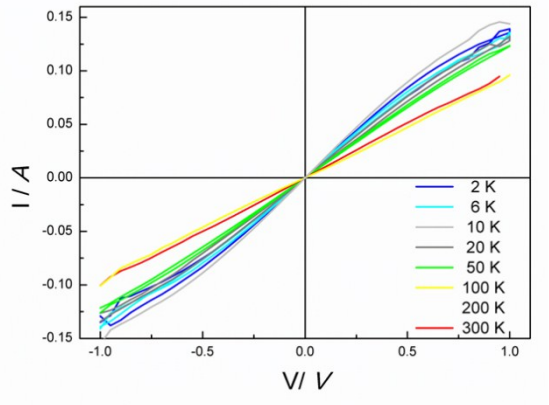


Figure S7. (A) I-V of the graphene matrix at 300 K, and (B) resistance versus temperature. No MR dependence has been found at any temperatures.

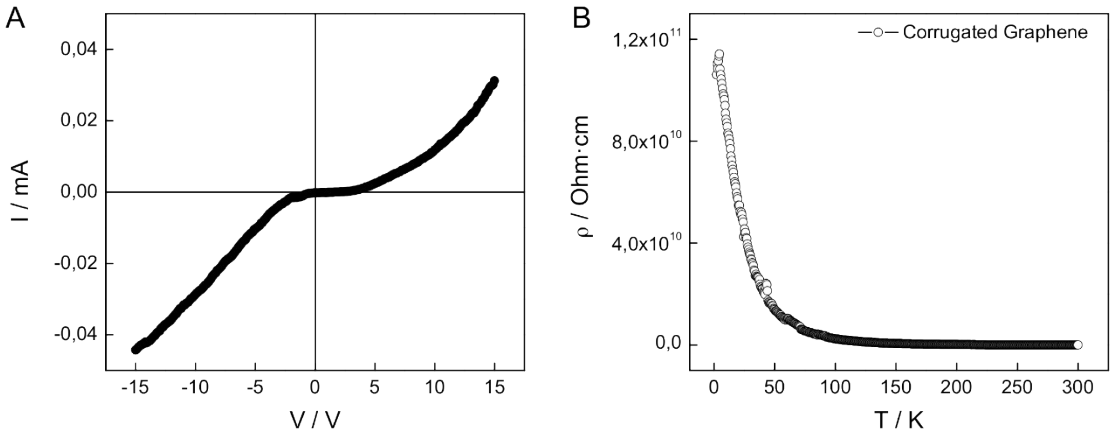


Figure S8. (A) Resistivity (logarithmic scale) as a function of $1/T$ for **$FeNi_3$–G** nanocomposite in the temperature range 300 K to 20 K. (B) Resistivity (logarithmic scale) as a function of $1/T^{-1/2}$ for **$FeNi_3$–G** nanocomposite in the temperature range between 20 K to 2 K.

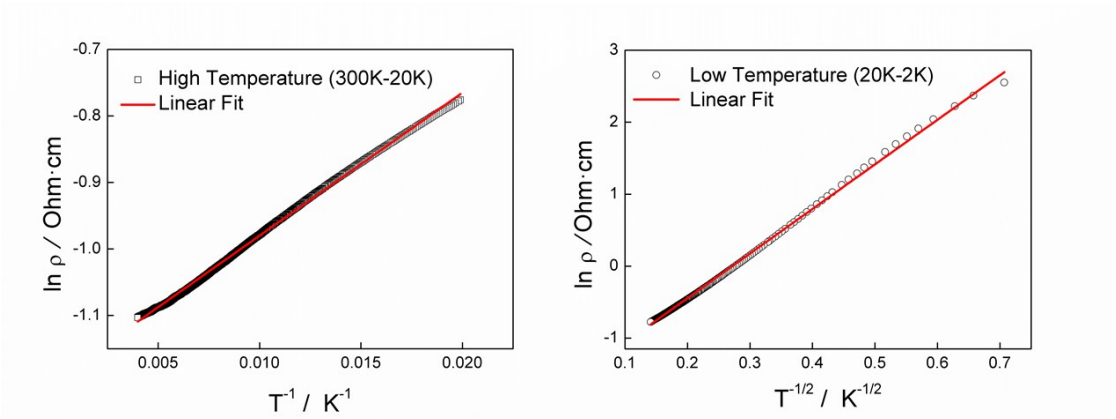
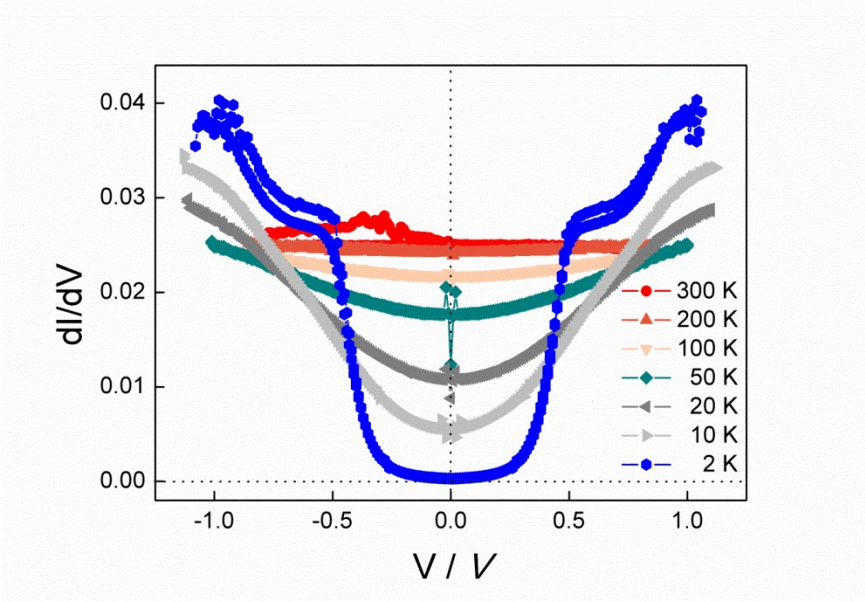


Figure S9. The calculated conductance dI/dV for the I-V characteristic curves, for all the temperature range studied. The corresponding voltage threshold versus temperature.



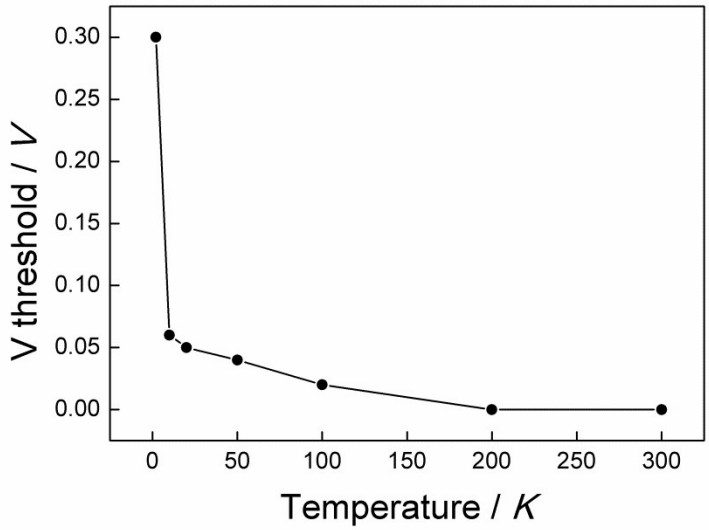


Figure S10. Resistance and magnetoresistance curve of the **$FeNi_3$–G** for different temperatures.

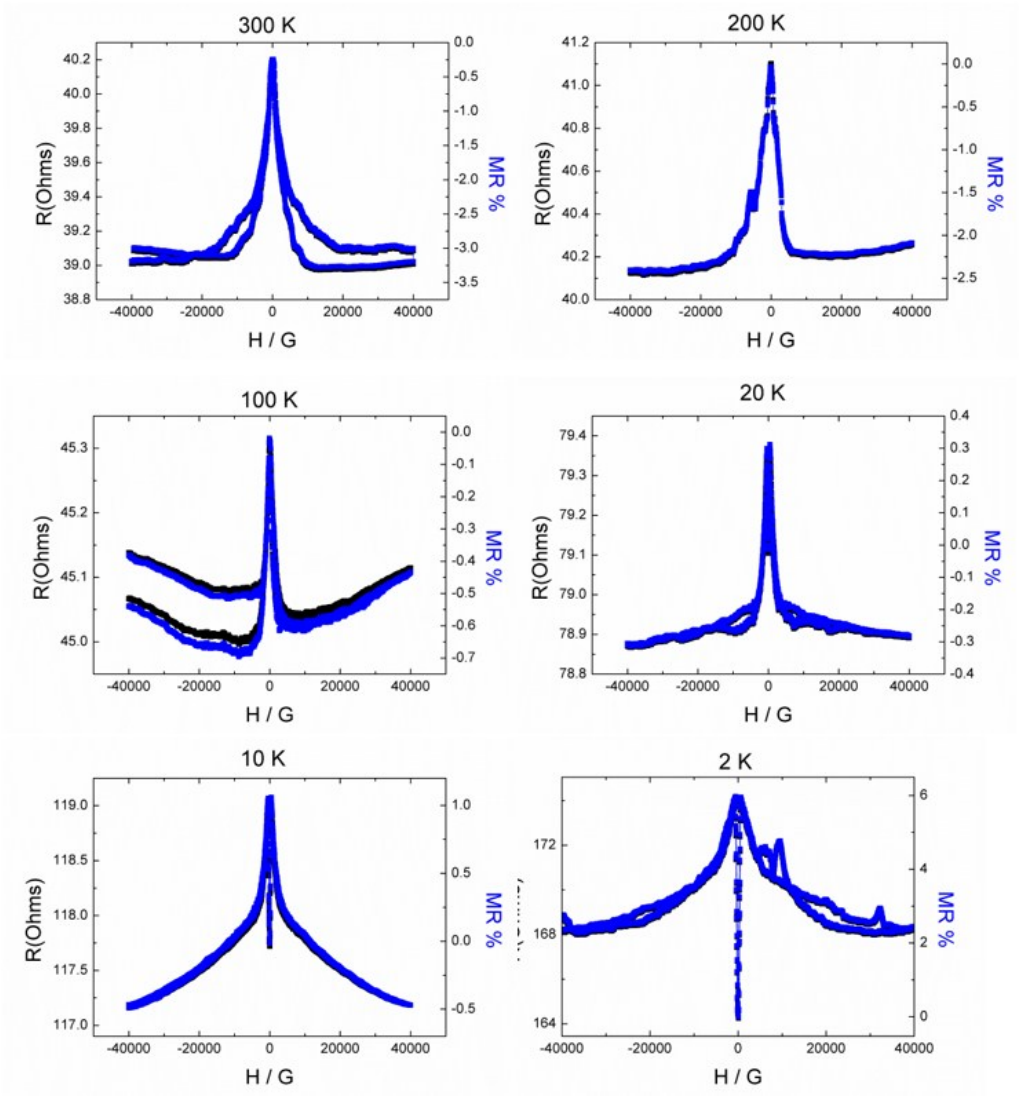


Figure S11. Resistance and magnetoresistance curve of the **$FeNi_3$–NP** for different temperatures.

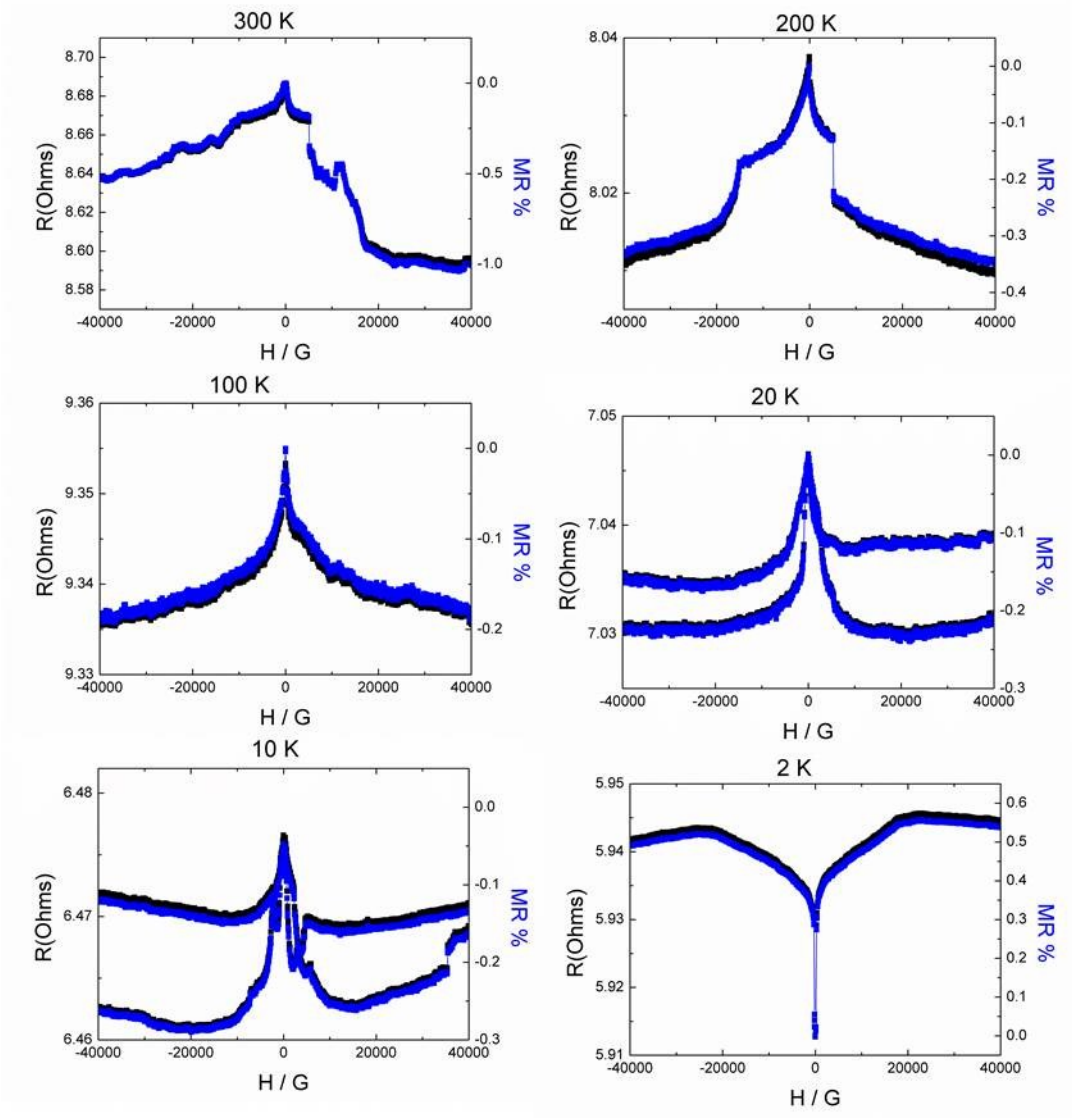


Figure S12. Fit of the magnetoresistance curve of the **$FeNi_3$–G** and **$FeNi_3$–NP** The dependence of the MR with the magnetic field follows a Lorentzian at low fields.