



PRODUCT DATA SHEET

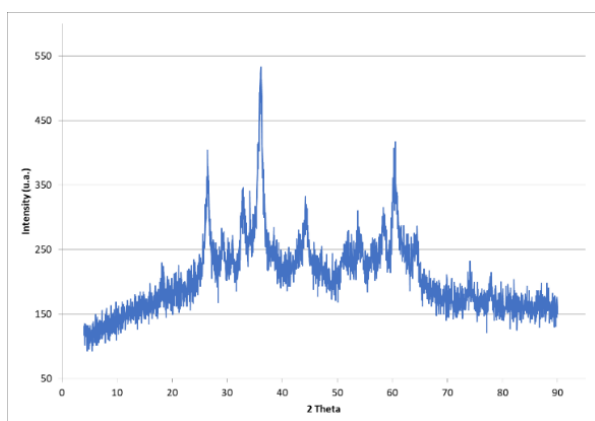
Super - paramagnetic Nanocomposite

The nanocomposite has been synthesized by the formation of nanoparticles of manganese and iron oxides in the surface of pristine graphene nanoplatelets. The product has the following composition: Manganese diiron oxide 70-75%, Graphene 30-25% and Volatiles <1.5%.

The addition of manganese and iron oxides nanoparticles synthesized with Gnanomat IP confers super-paramagnetic properties to pure graphene. The nanomaterial showed interesting features for EMI shielding and hyperthermia applications according to the literature.

Gnanomat develops and tailor-made nanocomposites of carbon materials with nanoparticles and additives of different source for technologically advanced applications.

Super-Para-Magnetic nanocomposite	
Form	Powder
Morphology	Graphene lateral size: 40-200 nm Crystallite size (XRD): < 25 nm BET Surface area: 150 m ² /g
Color	Black
Potential uses and applications*	Hyperthermia EMI shielding
Composition	Manganese/Iron oxide 70-75% Graphene 30-25% Volatiles <1.5%



*XRD spectra

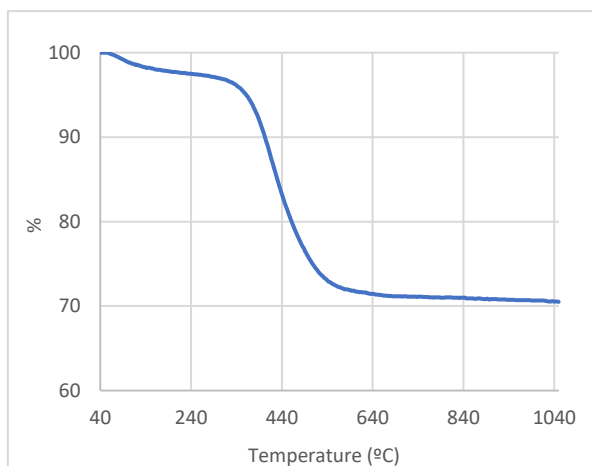


*Superparamagnetic Graphene

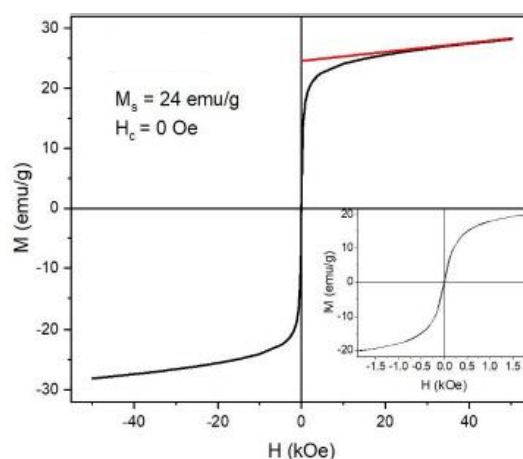




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*Thermogravimetric curve



*Magnetic characterization

About Gnanomat

Gnanomat, your nanotech partner of choice to bring nanomaterials to Industrial applications. The Company offers a versatile range of advanced materials for technologically advanced applications.

Nanomaterials need to be tailored for each specific device and application to ensure the best performance and we establish early collaborations with clients through custom product development.

Contact us to design and optimize products that from the first moment address the customer pains and offer real solutions that can fit into your manufacturing process.

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*Uses and application references:

"Ultra-high rate of temperature increment from superparamagnetic nanoparticles for highly efficient hyperthermia. Jae-Hyeok Lee, Bosung Kim, Yongsub Kim & Sang-Koog Kim. 2021 Mar 2;11(1):4969. doi: 10.1038/s41598-021-84424-1."

"Self-heating evaluation of superparamagnetic MnFe₂O₄ nanoparticles for magnetic fluid hyperthermia application towards cancer treatment. Supriya R. Patade, Deepali D. Andhare, Sandeep B. Somvanshi, Swapnil A. Jadhav, Mangesh V. Khedkar, K.M. Jadhav. (<https://doi.org/10.1016/j.ceramint.2020.07.029>)."

"Phase Transformation of Superparamagnetic Iron Oxide Nanoparticles via Thermal Annealing: Implications for Hyperthermia Applications. Federica Crippa, Laura Rodriguez-Lorenzo, Xiao Hua, Bart Goris, Sara Bals, José S. Garitaonandia, Sandor Balog, David Burnand, Ann M. Hirt, Laetitia Haeni, Marco Lattuada, Barbara Rothen-Rutishauser, and Alke Petri-Fink. (<https://doi.org/10.1021/acsanm.9b00823>)."

