

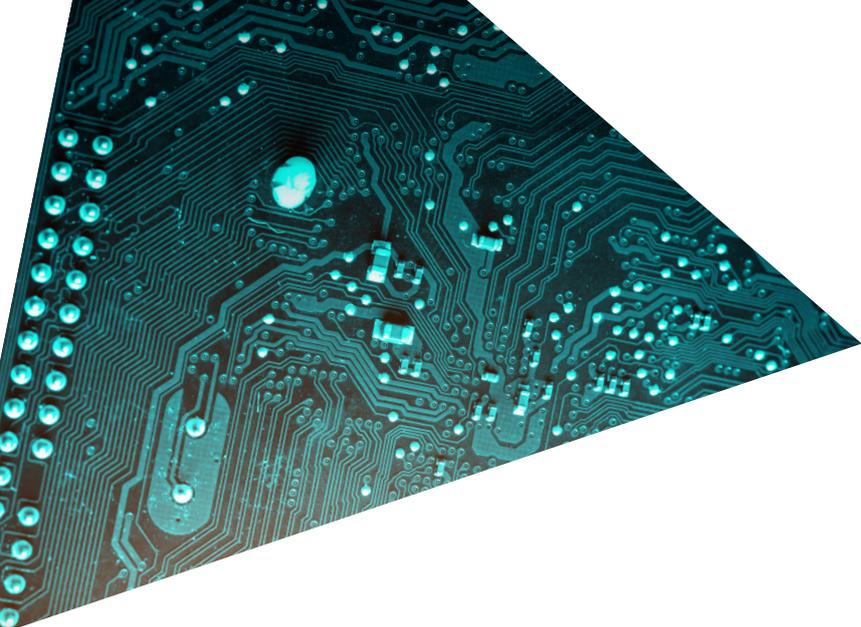
HYMAC'IN



# **NANOMAG-Fe**

Iron oxide nanopowder  $\text{Fe}_3\text{O}_4$

November 2023



# Discover HYMAG'IN

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HYMAG'IN produces and sells several ranges of innovative ferrite-based magnetic materials. The products are ultra-fine powders or semi-finished products for additive manufacturing, such as magnetic filaments. HYMAG'IN products are aimed at aerospace, defense, automotive and telecom markets.

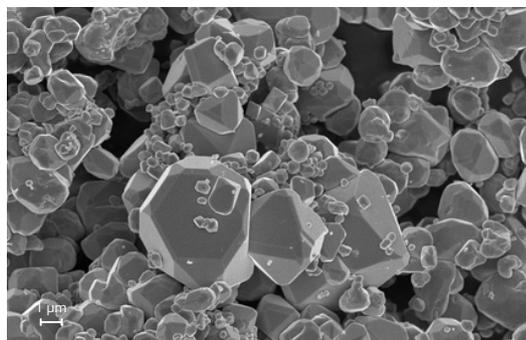
Ferrites are widely used in electronic systems. They are essential magnetic materials for passive components and solutions for electromagnetic compatibility (EMC). However, ferrite users face many challenges:

- miniaturize to reduce weight and volume
- reduce their environmental impact and energy consumption
- secure their supply chains

HYMAG'IN provides a solution to these needs by producing ferrites 100 times smaller, using a unique, sustainable and low-energy technology based in Europe.

NANOMAG-Fe is a key element in EMC, thanks to its ability to absorb microwave electromagnetic waves.

# NANOMAG-Fe | Features

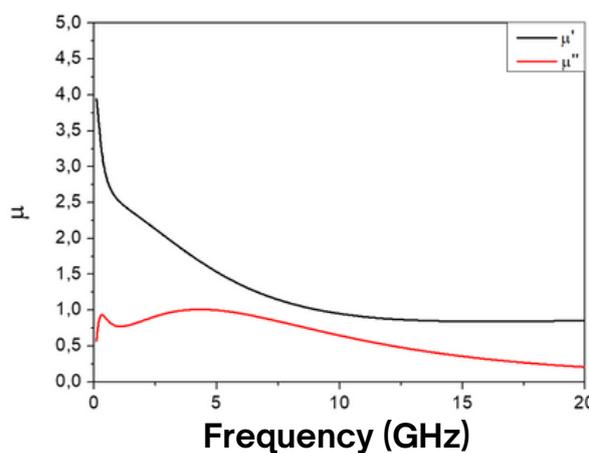
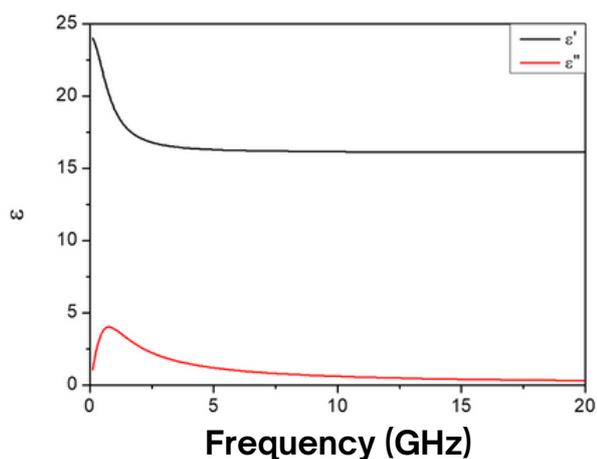


NANOMAG-Fe is a powder of iron oxide  $\text{Fe}_3\text{O}_4$ .

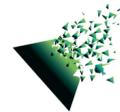
The quality of NANOMAG products is characterised by electron microscopy (SEM-EDS) and X-ray diffraction (XRD).

## SEM PICTURES

Density		5 g/cm <sup>3</sup>
Purity		99.99 %
Laser granulometry		4,6 μm (avg)
Crystal size (SEM)	D10	240 nm
	D50	700 nm
	D90	1 600 nm
Curie temperature		580 °C
Saturation magnetisation		86 emu/g
Use frequencies		1 à 20 GHz



## PERMITTIVITY AND PERMEABILITY OF A COMPOSITE FILLED AT 70%WT



# Why choose NANOMAG-Fe?

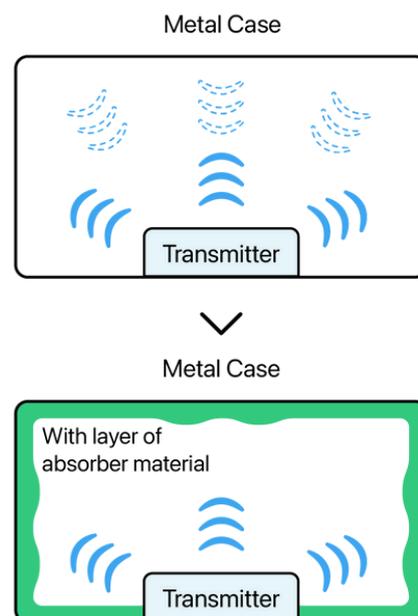
NANOMAG-Fe powder is easily incorporated into all types of polymers and silicones to produce electromagnetic absorbing composite materials, such as thin, flexible, easily machinable sheets. These composites can also be used to make shielding gaskets, absorbing foams, magnetic paints and other products.

Below are examples of EMC use cases after shaping NANOMAG-Fe.

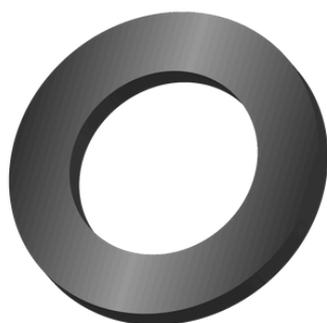
## ABSORBERS IN METAL CASINGS

Adhesive absorbing sheets, based on NANOMAG-Fe dispersed in silicone, are positioned inside the metal casings protecting the electronic board components.

These sheets absorb energy to attenuate interference due to wave reflection within the resonant cavity.



## SHIELDING GASKETS



Magnetic-absorber EMC gasket

Elastomer gaskets filled with NANOMAG-Fe are used in the connector area of a metal casing.

This solution supplements the metal shielding provided by the housing, as it prevents energy leaks that could cause perturbations outside the electronic system.

# CONTACT US

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## FERRITES AND OTHER CUSTOM-MADE PRODUCTS

Looking for unique specifications?

Let's work together to develop your ideal product!

Our R&D team can work on the following points:

- particle size;
- chemical composition: introduction of elements into the crystalline structure;
- static and frequency electromagnetic properties;
- the combination of our magnetic fillers with matrices with suitable mechanical properties to create composite absorbers, dense products for power electronics or filaments for additive manufacturing.

NEED MORE INFORMATION?  
**CLICK HERE TO CONTACT US**

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