FIT-4-NMP Networking and Brokerage Event

organized by FIT-4-NMP H2020 project at the 45th International Semiconductor Conference - CAS 2022

Magnetic Additive Manufacturing

Short description of topic (scientific description)

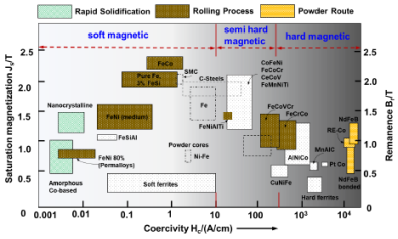
In recent years, Additive Manufacturing (AM), also called 3D printing, has been expanding into several industrial sectors due to the technology providing opportunities in terms of improved functionality, productivity, and competitiveness. While metal AM technologies have almost unlimited potential, and the range of applications has increased in recent years, industries have faced challenges in the adoption of these technologies and coping with a turbulent market. Despite the extensive work that has been completed on the properties of metal AM materials, there is still a need of a robust understanding of processes, challenges, application-specific needs, and considerations associated with these technologies.

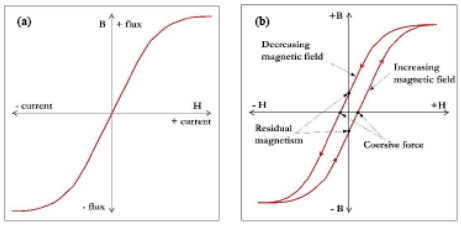
Magnetic composite materials have gained more attention in recent years. Composite magnetic materials are especially attractive to manufacturers of small motors and actuators for household and automotive use as well as to the audio, video, and computer industries. These magnets fall into two categories such as soft and hard composites.

•Soft magnetic composites usually iron-based, are obtained by pressing soft magnetic powder with a dielectric binder.

•Hard magnetic composites usually Nd-Fe-B, are obtained by bonding hard magnetic powder with a dielectric binder.

Magnetic composites are an essential technology for energy conversion and are desirable to be obtained from AM processes. These magnets must be pre-charged prior to their use in an application and must maintain this magnetization during an intended operation. Additionally, permanent magnets must generate the required magnetic flux for a given application. Therefore, understanding the magnetic properties of AM-fabricated magnets is essential.





Short description of Organization/Laboratory/Department:

The Magnetic Materials Laboratory has extensive experience in the research of hard and soft magnetic alloys obtained in cast, melt-spun ribbons, microwires and thin film forms experimentally developed for various applications. Besides research the department has experience also in $Nd_2Fe_{14}B$ and Alnico magnets production.

Main areas:

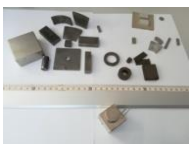
I) Hard magnetic materials

•Researches for Reducing Deficient Elements (Rare Earths, Co, etc.)

•Improving the magnetic properties of classical magnets by structural changes

•New magnets with spin interaction

•Emerging technologies for recovery of magnet from waste WEEE applications of hard magnetic materials



II) Soft magnetic materials

•RDI for new magnetic micro / nanostructure materials or amorphous alloys

•RDI for new soft magnetic micro / nano powders materials usable in additive manufacturing

•Soft magnetic materials applications

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Reference of Call/ topic of interest.
Potential contribution/ main ideas
Advance Materials: Materials for additive manufacturing

FIT-4NMP received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 958255