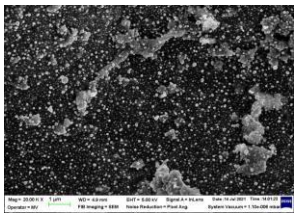
PARTNER PRESENTATION AND INTEREST IN HORIZON EUROPE PARTICIPATION

Microwave Absorber Composites Structures Based on Ferromagnetics - Graphene Derivatives, with Heat Dissipation Capabilities

Short description of topic (scientific description)

With the explosive progress in telecommunications and electronic interfaces, the effects of dangerous electromagnetic interferences can no longer be excluded. The electromagnetic pollution has launched an increase of researches on possible consequences and remedies, in order to identify, design and produce new materials and composite systems for electromagnetic shielding. The proposal idea appears as answer to the necessity to identify and develop new composite structures that improve the operating, by eliminating interference and allow the radiation level reduction, by absorption. For example, whereas military electronics used to operate in a narrow band of frequencies, today, military design engineers must protect equipment from damaging signal interference and enemy detection at a wider range of frequencies than ever before including radar at frequencies as low as 100 MHz and as high as 95 GHz. The microwave absorbing materials plays an increasing significant role in national defence security, health, electronics reliability. The project proposes an improved composite media for microwave absorption, formed by heterostructures, including ferromagnetic constituents, consisting of metallic nanoparticles as FeNi3, FeCo or FeNiCo and dielectric components, on the one hand, a reduced graphene oxide network, in which the ferromagnetic nanoparticles are fixed, on the other hand a polymer, activated with components that assure the heat dissipation.



ICPE-CA has developed composites based on graphene derivatives decorated with Fe/Fe2O3, FeNi3 or FeCo nanoparticles, reaching a level for effectiveness of electromagnetic shielding SEdB of 120 – 130 dB at frequency of GHz order.

SEM image of the FeCo nanoparticles grafted on graphene derivatives (x 20000)

Short description of Magnetic Materials Laboratory:

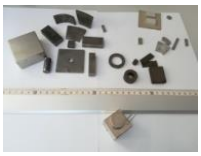
The Magnetic Materials lab has extensive experience on research of hard and soft magnetic materials, prepared as cast, melt-spun ribbons, glass-coated microwires and thin films, and also on design and development of various applications including these materials. Besides research, the lab has expertise also on production of NdFeB and Alnico magnets.

Main areas of interest:

a) Hard magnetic materials

- researches for reducing critical elements (rare earths, cobalt) in magnetic materials;
- improvement of magnetic properties of classical magnets by structural changes;
- development of new magnets with spin interaction;
- emerging technologies for recovery of magnet from WEEE; applications of hard magnetic materials.



b) Soft magnetic materials

- development of new magnetic micro / nanostructure materials or amorphous alloys;
- preparation of novel soft magnetic micro / nanopowders material, for additive manufacturing
- applications of soft magnetic materials.

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Reference of Call/ topic of interest.
- Advanced materials / Manufacturing technologies
Potential contribution/ main ideas
- Complex characterization of materials behavior in high frequency;
- Development and production of microwave absorbers based on the novel materials.

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