

# MAGNETISM AND MAGNETIC MATERIALS

September 24 - 26, 2018 | Budapest, Hungary

Alessio Adamiano, Mater Sci Nanotechnol 2018, Volume 2

## ON THE MAGNETIC PROPERTIES OF FE-DOPED HYDROXYAPATITE NANOARTICLES

**Alessio Adamiano**

Institute of Science and Technology for Ceramics (ISTEC-CNR), Italy

Magnetic nanoparticles (MNPs) have strongly emerged in nanomedicine since their successful application in magnetic drug delivery, hyperthermia and contrast agent for diagnostic imaging. MNPs are required to be targeted to a tissue/organ to maximally accomplish their function, leading to high concentrations in a localized area and thus to the possible arising of toxic implications. To circumvent these issues, numerous studies were focused on doping well-known biocompatible materials with magnetic ions to obtain intrinsically safe and biocompatible magnetic biomaterials. At this regard, the control over the doping mechanism is a key factor for an accurate synthesis of the targeted biomaterial with high biological and magnetic properties. In this work, we investigate the relation between the synthesis temperature and the structural and magnetic properties of hydroxyapatite nanophases synthesized by wet neutralization method in the presence of Fe<sup>2+</sup>/Fe<sup>3+</sup> ions. We demonstrate how the control of the synthesis parameters uniquely yields the formation of hydroxyapatite nanophase exhibiting partial with both iron ions - and the simultaneous formation of iron oxide- based secondary phase - thus obtaining a nanocomposite (FeHA) whose structural and magnetic properties are strictly related to the doping temperature determining the final iron setting.

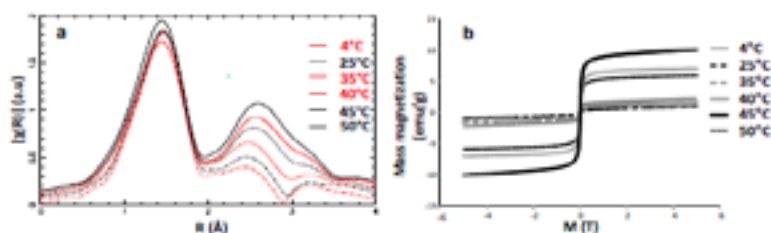


Fig. 1 Modulus of the Fourier Transforms of the EXAFS signals (a) and Magnetization versus magnetic field isotherms collected at 300 K (b).

### Recent Publications

1. Adamiano A et al., (2017). Biomineralization of a titanium-modified hydroxyapatite semiconductor on conductive wool fibers. *Journal of Materials Chemistry B*. 5 (36): 7608-7621.
2. Adamiano A et al., (2017). Fe-Doping-induced magnetism in nano-hydroxyapatites. *Inorganic Chemistry*. 56(8): 4446-4458.
3. Piccirillo C, et al. (2017). Luminescent calcium phosphate bioceram-

ics doped with europium derived from fish industry byproducts. *Journal of the American Ceramic Society*. 100 (8): 3402-3414.

4. Sprio S et al. (2017). Tissue engineering and biomimetics with bioceramics. *Advances in Ceramic Biomaterials*. 407-432.

## BIOGRAPHY

Alessio Adamiano is a Researcher for the Italian National Research Council (CNR) at the Institute of Science and Technology for Ceramic Materials. He obtained his PhD in Environmental Science with a project on the analysis of protein driving biomineralization processes in Mediterranean corals. Over the last five years, he has been investigating the applications of magnetic calcium phosphate materials to regenerative and nano-medicine. Recently, he was awarded together with Drs C Piccirillo and M Iafisco by the Italian Ministry of Agricultural, Food and Forestry Policies for the project "RECOVER" on the transformation of fishery by-products into valuable biomedical products. He has published more than 25 papers in international journals and six book chapters.

[alessio.adamiano@itec.cnr.it](mailto:alessio.adamiano@itec.cnr.it)