KMS-2-A3 (Oral)

Characterization and microwave properties of soft magnetic nanomaterials

J.H. Wu[1] and Y.K. Kim[2]
[1] Research Institute of Engineering and Technology, Korea University,
Seoul 136-713, Korea, E-mail: wujh@korea.ac.kr
[2] Department of Materials Science and Engineering, Korea University,
Seoul 136-713, Korea, E-mail: ykim97@korea.ac.kr

Nanocrystalline soft magnetic materials have superior properties such as high saturation magnetization with low coercivity and find applications as advanced electromagnetic materials. Particularly, high-permeability magnetic nanomaterials for high-temperature applications have been vigorously pursued to meet ever-increasing requirements that can not be met by existing materials such as conventional ferrites at elevated temperature. We have designed and synthesized new magnetic materials based on CoFe by using the exchange coupling between neighboring magnetic nanograins to overcome the anisotropy and demagnetizing effect. Such design provides more degrees of freedom to tailor magnetic as well as electrical properties and is expected to deliver novel, tuneable, efficient performance other than obtainable from conventional processing, due to their small dimension, quantum effect, surface-volume ratio, surface energy, etc. In this presentation, we focus on the investigation of composition, nanostructure, magnetic and electromagnetic properties of the nanopowders synthesized from Fe and Co with doping of minute amount of elements (C, B, Zr...) by mechanical alloying and report the results obtained by XRD, SEM, HRTEM, XPS, XMCD, VSM and microwave measurements, demonstrating the promising microwave properties for advanced applications.