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Magnetization studies of electrospun BaFe12O19, Y3Fe5O12 nanofibers and bulk oxides via metal organic precursors

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Yttrium Iron Garnet (YIG), Barium hexa ferrite and YBCO superconductor have shown the importance in technology. We demonstrate that solid solution precursors employing 8-hydroxyquinoline as an organic precipitant to prepare YIG, barium hexa ferrite. This is for the first time we present an "aqueous route" to synthesize ferrites at record low temperatures, <500°C. The process involves only two steps (i) formation of metal complex and (ii) formation of metal oxides by calcinations of this precursor above 600°C. Unique feature of the calcinations is the exothermic decomposition wherein the metal ions act as oxidizer and the 8-hydroxyquinoline act as fuel leading to finely divided mixed metal oxides in a single step. The main scope of this approach is the scalability of the process where ferrites in gram quantities can be realized with much ease and simplicity. It is noteworthy to observe that the saturation magnetization of 54 emu/g and 22 emu/g for both BHF and YIG respectively, agree well with the reported data. Nanofibers of BaFe12O19, Y3Fe5O12 have been prepared by electro spinning technique. The thickness of the oxide nanofibers are between 60 to 100 nm showing better percolation and connectivity between the grains. Magnetic study of YIG and BHF show strong ferromagnetic behavior and RT magnetism with characteristic Ferromagnteic hysteresis.

Biography

Manish Patil has completed his Masters from Mumbai University. He is a doctoral student at Indian Institute of Technology Kanpur, India. B.M. Basavaraja is a post doctoral fellow specializing on nanofiber sysnthesis and Professor S.S. Manoharan is presently the Director of Nanocenter at The University of Mumbai.

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