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## Abstract

The industrial applications of substituted nanoscale hexaferrites are of immense importance

because of their versatile utility in modern technical and scientific world. It has been observed that Sn4+ and Zr4+ Substituted Nanoscale Calcium Hexaferrites have unique feature that their structural and magnetic properties can be tailored and manipulated to the practical extent. This salient feature makes them very useful in the design of microwave absorbers, switching devices and storage devices. Also, by virtue of their nano sized grain structure and improvised magnetic characters over those of earlier reported ferrites, they are not only found to be more economical but also more resolute. Therefore this class of hexagonal ferrites has been reported to be the promising candidate for electronic gadgets like high density recording media, microwave absorption devices, magneto-optic recording media, etc. In our exhaustive research module, base of calcium hexaferrite is substituted with Sn4+ and Zr4+ with stoichiometric proportions for x ranging for 0 to 5 in the generic formula Ca(Co-Sn)xFe12-2xO19 and Ca(Co-Zr)xFe12-2xO19. But for the present research module, only one combination for x = 2 is taken into explanation as it has shown to be more useful for aforementioned applications. The synthesis of Ca(Co-Sn)2Fe8O19 and Ca(Co-Zr)2Fe8O19 is carried out by recently reported technique i. e. Microwave Induced Sol-Gel Combustion Route. The morphological and structural parameters of the samples are studied by scanning electron microscopy and further by transverse electron microscopy which leads to confirm these samples into category of nanoscale ranging from 11. 52 nm to 36. 28 nm. The space group for the samples is observed to be p63/mmc as confirmed by Reitveld quantitative analysis. The magnetic characterization of the samples is done by vibrating sample magnetometry. The saturation magnetization (Ms), coercivity (Hc) and retentivity (Mr) of the samples are found in the ranges which are aptly suitable for microwave absorbers, switching as well as storage devices. Further investigation is underway to tailor their properties to fit them for these more demanding applications in the modern technology.

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