

Synthesis and investigation of Pr-Cu substituted CTAB assisted microwave absorbing nano-material suitable for super high frequency applications

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Abstract

The main theme of this work was to synthesize and investigate the microwave absorbing material (MAM). For this purpose, a rare earth Pr^{3+} and transition element Cu^{2+} substituted series of X-type hexaferrites $\text{Sr}_{2-x}\text{Pr}_x\text{Co}_2\text{Fe}_{28-y}\text{Cu}_y\text{O}_{46}$ with concentration ($x = 0, 0.02, 0.06, 0.1$ and $y = 0, 0.1, 0.3, 0.5$) was synthesized by adopting the sol gel method. The thermal analysis was carried out to know the sintering temperature at which the single x-type phase can be attained. The XRD patterns show the single phase for all the samples. The Pr-Cu substitution in pure x-hexaferrites changed the structural parameters. The nano-particle size of the material was confirmed from the TEM analysis. The HRTEM image and SAD pattern indicates that the material is well crystallized. The FTIR analysis also confirms the single phase for prepared materials. The increment in dielectric properties with Pr-Cu substitution was observed. The magnetic properties of the material were enhanced with additives. The material exhibited the minimum value of reflection loss (microwave absorption) at higher frequencies which makes this material useful to act as microwave absorbing material (MAM) for super high frequency (SHF) devices.

1. Imran S (2017) Study of structural, magnetic and microwave absorption properties of Dy-Mn substituted nanosized material in X-band frequency range. *Journal of Alloys and Compounds* 715:284-290.
2. Imran S (2018) Synthesis and electrical behavior of Ni-Ti substituted Y-type hexaferrites for high frequency application. *Journal of Magnetism and Magnetic Materials* 451:787-792.
3. Imran S (2016) Tunable microwave absorbing nano-material for X-band applications. *Journal of Magnetism and Magnetic Materials* 401:63-69.
4. Imran S (2017) Multiferroics $\text{BiMn}_{1-x}\text{Al}_x\text{O}_3$ nanoparticles: Synthesis, characterization and evaluation of various structural, physical, electrical and dielectric parameters. *Journal of Magnetism and Magnetic Materials* 433:71-75.
5. Imran S (2016) Enhanced microwave absorption properties of CTAB assisted Pr-Cu substituted nanomaterial. *Journal of Magnetism and Magnetic Materials* 414:198-230.

Recent Publications



Biography

Imran Sadiq has earned his PhD in 2014. Currently he is working as Assistant Professor in Centre of Excellence in Solid State Physics, University of the Punjab, Lahore, Pakistan.

Currently, he is supervising three research students. He has published more than 25 research papers in international peer reviewed journals.

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