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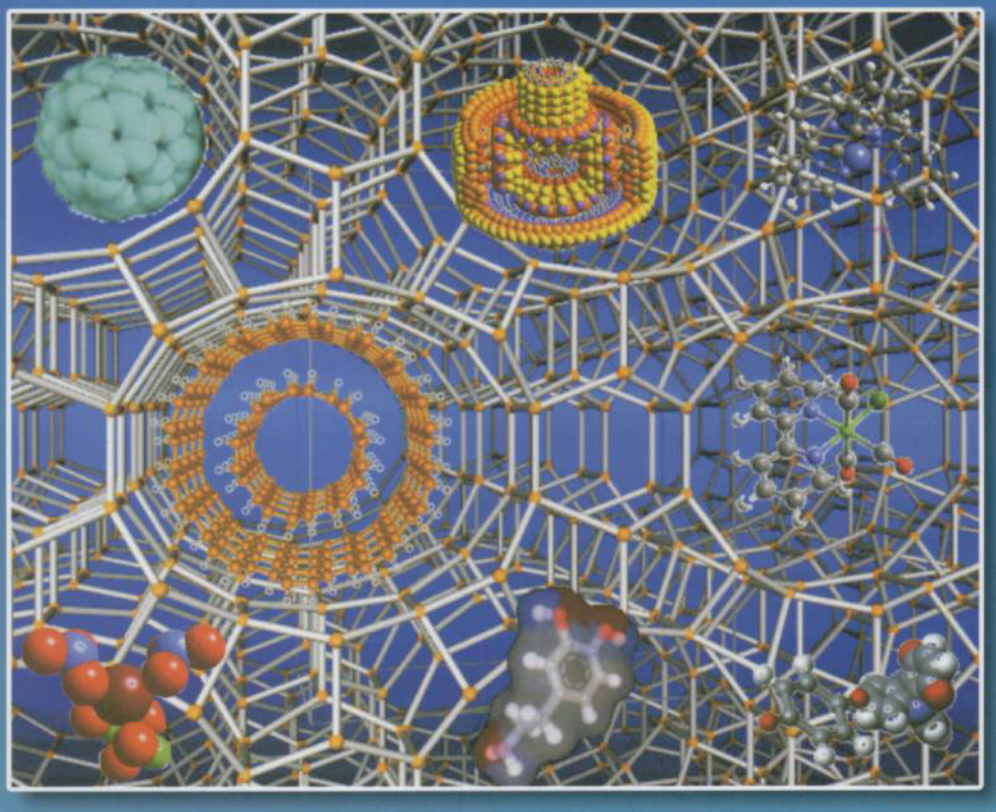

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Magnetic properties of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ nanoparticle.

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Polycrystalline $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ were prepared using the sol-gel method. Weighted amounts of $Tb(NO_3)_3 \cdot 5H_2O$, $Tb(NO_3)_3 \cdot 5H_2O$, $Bi(NO_3)_3 \cdot 5H_2O$, and $Fe(NO_3)_3 \cdot 9H_2O$ were first dissolved in 2-methoxyethanal (2-MOE) and acetic acid. The solution was refluxed at 80 °C for 24 h to allow gel formation, and then dried at 120 °C for 24h. The dried powder were ground and annealed at temperature 900 °C for 3h in air. The crystallographic and magnetic properties of powders were studied by using x-ray diffraction and vibrating sample magnetometer. Crystal structure of the samples is determined to be normal cubic structure *Ia3d* by Rietveld refinement. The particle sizes calculated using scherrer equation of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ are 60 and 47 nm, respectively. The determined lattice constants of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ are 12.499 and 12.459 Å, respectively. The saturation magnetization (M_s) and coercivity (H_c) can be controlled by bismuth contents in bismuth substituted terbium iron garnet [1]. In this study, we report on the magnetic properties of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ nano powder. The M_s of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ is 10.234 and 14.404 emu/g, respectively. And the H_c of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$ is 56.57 and 32.33 Oe, respectively. $Ho_2Bi_1Fe_5O_{12}$ shows the larger M_s and smaller H_c than $Tb_2Bi_1Fe_5O_{12}$.

References

1. I. J. Park, K. U. Kang, and C. S. Kim, IEEE Trans. Mag., 42(10) p.2882 (2006)