

## Impact of (Pr, Dy) co-doping at Bi site on optical and multiferroic properties of BiFeO<sub>3</sub> ceramics prepared by sonochemical method

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A series of Pr and Dy were substituted at Bi of BiFeO<sub>3</sub> were synthesized by sonochemical method. keeping Pr at 5%, Dy composition was varied to obtain Bi<sub>0.95-x</sub>Pr<sub>0.05</sub>Dy<sub>x</sub>FeO<sub>3</sub> ( $x = 0.01, 0.03$  and  $0.05$ ). The X-ray diffraction pattern and Rietveld refinement analysis reveals the rhombohedral structure for the co-doped BFO samples. The Diffuse Reflectance Spectra (DRS) exhibit bands in ultraviolet and visible region and the energy band gap values are in the range of 1.91 eV to 2.1 eV and gap increases with Dy increase. Our study shows that Pr and Dy dopants improved the ferroelectric and magnetic properties for low concentration of Dy indicating that they are good multiferroic materials. The excellent ferroelectric loops were recorded at the various electric fields. It was noted that the current leakage and the remnant magnetization is less for 5% Dy indicating that impact of the higher concentration of the Dy dopants. However, the lower content of Dy exhibited good results speculating the possibility of these materials for suitable applications.

**Keywords:** Sonochemical, X-ray diffraction, Band gap, Ferroelectric, Leakage current density, Ferromagnetic.

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