



Research Role of Post-irradiation Dielectric, Electrical, Optical and Ferroelectric Properties of LZO in Electron and Gamma Irradiations

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Abstract

Radiation-induced modification of functional materials is an important area of research for understanding their stability and potential applications in radiation-rich environments. This study focuses on the post-irradiation dielectric, electrical, optical, and ferroelectric properties of LZO under electron and gamma irradiation. The research aims to investigate how different radiation types and doses influence the structural, electronic, dielectric, and polarization-related characteristics of LZO. Irradiation can generate defects, vacancies, trapped charges, and localized electronic states, which may significantly alter charge transport, dielectric response, optical absorption, and ferroelectric behaviour. The proposed investigation will involve controlled exposure of LZO samples to selected electron and gamma radiation doses, followed by systematic characterization of their post-irradiation properties. Dielectric measurements over appropriate frequency and temperature ranges will be used to evaluate changes in dielectric constant, dielectric loss, and relaxation behaviour. Electrical characterization will focus on conductivity and charge-transport mechanisms, while optical analysis will examine changes in absorption characteristics and optical band-gap-related parameters. Ferroelectric measurements will be used to determine changes in polarization, coercive field, and hysteresis behaviour. Comparative analysis of electron- and gamma-irradiated samples will help establish relationships between radiation-induced defects and functional properties. The study is expected to provide insights into the radiation tolerance and modification mechanisms of LZO and contribute to the development of reliable dielectric, ferroelectric, optical, and electronic materials for radiation-sensitive and radiation-exposed technological applications.

Keywords: LZO, electron irradiation, gamma irradiation, dielectric properties, electrical properties, optical properties, ferroelectric properties, radiation effects, polarization, radiation-induced defects.

