[microreview]

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ADVANCED CERAMICS: INTRINSIC AND EXTRINSIC FACTORS

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Abstract

The efficiency of electronic devices based on advanced ceramics is related to the optimization of the material's properties. In this paper, we discuss the intrinsic and extrinsic factors that influence the properties of advanced ceramics.

keywords: Ceramics; Ceramic processing; Ceramic properties; Advanced materials.

The most updated version of this paper is available at

<https://osf.io/xt7h6/download>

Introduction

1. Advanced ceramics are characterized due to their optical, mechanical, thermal, electrical, multiferroic, magnetic, and ferroelectric properties [1–3].
2. Electronic devices use one or more properties of (1) [4–6].

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Methods

3. A systematic literature review was carried out in the area of materials science and engineering.

Results and Discussion

4. The advanced ceramics properties (1) are related to its intrinsic and extrinsic factors [7].
5. Intrinsic factors are composition, crystalline symmetries, charge/polarization distributions, cell parameters, homogeneity, and crystallinity [8–10].
6. Extrinsic factors are grain size, ferroelectric domain, texture, density, and porosity [11–13].
7. (5) and (6) are modified by the processing route, purity of precursors, stoichiometric strategies, and sintering processes [14, 15].
8. (5) and (6) must be tuned to optimize the ceramic properties (1), as shown in Fig. 1 [16].

Figure 1: Balance between intrinsic and extrinsic factors.

9. The circles on the arrows in Fig. 1 are not uniform and represent that one factor may be more predominant than another [17].

10. The relevant factors are defined during the material's processing and characterization [18].

Final Remarks

11. Optimized properties in advanced ceramics require know-how on the influence of intrinsic and extrinsic factors.

Open Invitation

*Review, add content, and **co-author** this paper [19].*

*Join the **Open Engineering Collaboration**.*

Send your contribution to andre@selfchargebox.com.

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The **latex file** for this paper together with other *supplementary files* are available [20].

Agreement

12. *All authors **agree** with [21].*

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