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REVIEWER'S REPORT

Manuscript No.: IJAR- 55742
Title: Sinter Crystallization of Soda Lime Silicate Waste Glass Modified With Eggshell Derived CaO for Glass Ceramic Tile Applications

Recommendation:
Accept

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality	Yes			
Clarity	Yes			
Significance		Yes		

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.
Acceptance Comment are mentioned below suitable for the paper titled "Sinter Crystallization of Soda Lime Silicate Waste Glass Modified With Eggshell Derived CaO for Glass Ceramic Tile Applications"

Reviewer Comments: Accept

Reviewer Comments –

Introduction

The introduction is well-structured and effectively establishes the relevance of utilizing post-consumer and industrial waste for sustainable material development. The authors clearly highlight the environmental challenges associated with waste glass and eggshell disposal while positioning glass-ceramic tiles as a high-value application. The motivation for using eggshell-derived CaO as a low-cost and sustainable modifier is well articulated, and the research objectives are clearly defined. The introduction successfully bridges sustainability concerns with material performance requirements, providing a strong foundation for the study.

Literature Review

The literature review demonstrates a sound understanding of prior research on waste-derived glass ceramics and sinter crystallization techniques. Relevant studies are appropriately cited, and the gaps in existing research—particularly the limited use of eggshell-derived CaO in soda lime silicate waste glass systems—are clearly identified. The review justifies the novelty of the work and supports the selection of materials and processing conditions. Overall, the literature survey is comprehensive and aligns well with the study objectives.

Solution Approach / Methodology

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The experimental approach is systematic and well designed. The selection of waste TV panel glass as a silica-rich matrix and eggshell-derived CaO as a fluxing and modifying agent is both innovative and environmentally responsible. The sinter crystallization process parameters, including compaction and sintering temperatures, are appropriately chosen and clearly described. The use of complementary characterization techniques (XRF, XRD, FTIR, SEM/EDS) ensures a thorough understanding of phase composition and microstructural evolution, demonstrating methodological rigor.

Results and Discussion

The results are clearly presented and logically discussed. XRD analysis effectively confirms partial crystallization with quartz and calcite as dominant phases, while SEM/EDS observations provide strong evidence of enhanced densification and microstructural refinement with increasing sintering temperature. The correlation between microstructure, phase evolution, and mechanical performance is well established. The identification of 700 °C as the optimal sintering temperature is convincingly supported by improvements in compressive strength, density, hardness, abrasion resistance, and chemical durability. The discussion reflects a good balance between experimental evidence and scientific interpretation.

Conclusion

The conclusion succinctly summarizes the key findings and reinforces the significance of the study. The authors clearly demonstrate that waste glass and eggshell-derived CaO can be successfully valorized into durable glass-ceramic tiles suitable for sustainable construction applications. The conclusions are well supported by the experimental results and emphasize both the technical feasibility and environmental benefits of the proposed approach. The study contributes meaningful insights to the fields of waste recycling, glass ceramics, and sustainable building materials.