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Special Issue Reprint

Synergy in Polyphase Materials

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The Special Issue, 'Synergy in Polyphase Materials: Harnessing the Power of Glass and Ceramics', assembles eight open access papers that collectively demonstrate how targeted processing strategies translate into controllable microstructures and, ultimately, measurable performance gains across optical, thermal, electrical, tribological, and bioactive domains. A central theme in this Special Issue is the shift from viewing multiphase systems as an unavoidable complexity to treating them as a deliberate platform for property tuning. This is particularly clear in glass–ceramics, where phase selection, crystal size distribution, and the chemistry of residual glass decisively determines both their functional responses and reliability. The presence of vitreous components in polyphase materials is crucial due to their universality, which is provided by the amorphous state of this solid phase of amorphous materials. They enable unlimited variations in compositions tolerating arbitrary ratios between components of glass which can be defined as, following Michael Faraday, “a solution of different substances one in another”. This is effectively used during the phase assemblage of composite materials, which is outlined in the contributions of this Special Issue as an addition to previous dedicated topical collections concerning polyphase materials.



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