




## Development and characterization of ceramic-polymeric hybrid scaffolds for bone regeneration: incorporating of bioactive glass BG-58S into PDLA matrix

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### ABSTRACT



In recent years, there has been a notable surge of interest in hybrid materials within the biomedical field, particularly for applications in bone repair and regeneration. Ceramic-polymeric hybrid scaffolds have shown promising outcomes. This study aimed to synthesize bioactive glass (BG-58S) for integration into a bioresorbable polymeric matrix based on PDLA, aiming to create a bioactive scaffold featuring stable pH levels. The synthesis involved a thermally induced phase separation process followed by lyophilization to ensure an appropriate porous structure. BG-58S characterization revealed vitreous, bioactive, and mesoporous structural properties. The scaffolds were analyzed for morphology, interconnectivity, chemical groups, porosity and pore size distribution, zeta potential, pH, *in vitro* degradation, as well as cell viability tests, total protein content and mineralization nodule production. The PDLA scaffold displayed a homogeneous morphology with interconnected macropores, while the hybrid scaffold exhibited a heterogeneous morphology with smaller diameter pores due to BG-58S filling. The hybrid scaffold also demonstrated a pH buffering effect on the polymer surface. In addition to structural characteristics, degradation tests indicated that by incorporating BG-58S modified the acidic degradation of the polymer, allowing for increased total protein production and the formation of mineralization nodules, indicating a positive influence on cell culture.

### ARTICLE HISTORY

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