

## Chapter 10

# Bioactive Composites Reinforced with Inorganic Glasses and Glass–Ceramics for Tissue Engineering Applications

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**Abstract** Bioactive composites, prepared by the combination of glasses or glass–ceramics with natural or synthetic polymers or blends, have been extensively exploited in bone tissue engineering. Their bioactive character is usually derived from the glass or glass–ceramic phase and is one of the most relevant properties to generate bone bonding. Herein we focus on the development of bioactive composite structures that target tissue engineering applications, with special emphasis on bone regeneration. Some concepts, e.g., bioactivity and biocompatibility, are initially introduced, followed by a description of the synthetic approaches that have been reported for the preparation of bioactive inorganic glasses or glass–ceramics. Different strategies to compound these inorganic particles with polymeric phases are detailed, spanning from conventional methodologies and wet spinning to rapid prototyping. Finally, a series of systems that have been developed for bone tissue engineering are described (including injectable systems, 3D scaffolds, membranes, and biomimetic layer-by-layer structures), as well as their *in vitro* biological response.

**Keywords** Bioactive composites • Glass–ceramics • Bioactivity • Biomaterials • Tissue engineering

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