scaffolds. In comparison to dip-coated scaffolds, EPD produced scaffolds exhibiting better particle packing, resulting in a shorter fabrication time. Fiorilli et al. (2015) coated glass-ceramic foam-like scaffolds with mesoporous BG by EPD. After 48 h of immersion in simulated body fluid (SBF), the authors achieved needle-like nanocrystals of hydroxyapatite on the EPD-coated scaffolds, while the noncoated scaffolds did not show any bioactive behavior even after 1 month of immersion.

Summarizing this section, it is necessary to point out that all described BG coatings need a sintering step to consolidate the BG coating on the substrate. The required thermal treatment might lead to changes in the microstructure of the substrates and even to degradation of the properties of the substrate, especially metals; therefore, coatings that do not necessitate high-temperature sintering are of high interest.

1.4 POLYMER/BG COMPOSITE COATINGS

The enhancement of the mechanical and antibacterial properties of materials has been an important aim in the development of material systems for biomedical applications. The use of polymers in combination with BGs to obtain coatings with suitable bioactivity, mechanical properties, and antibacterial effect is being widely considered in this regard, particularly for orthopedic applications.

1.4.1 PEEK-BG Coatings

Polyetheretherketone (PEEK) is an inert, nontoxic, and stable polymer (Seuss et al., 2016). It exhibits good mechanical properties and is being considered for many applications in the biomedical field (Moskalewicz et al., 2013). For PEEK coatings, it is necessary to apply heat treatments at moderate temperatures (<400°C) in order to avoid microstructural defects, such as cracks, and to create uniform surfaces. Normally, treatments to increase the crystallization of PEEK involve temperatures between 355°C and 365°C for durations of 60–150 min (Miola et al., 2015). Also the use of PEEK facilitates the deposition of BG particles with other inorganic particles, as demonstrated by Seuss et al. (2016) by developing PEEK-BG-Ag composite coatings. Moreover, Moskalewicz et al. (2013) developed PEEK/BG coatings using constant voltage EPD on TiAlV substrates. The ratio between the inorganic and polymeric phase was controlled to determine the bioactive behavior of the coatings. A low weight ratio (<0.3) was shown to lead to a high deposition of BG, which resulted in higher bioactivity and adhesion (Moskalewicz et al., 2013). In earlier studies, Boccaccini et al. (2006) developed PEEK-BG coatings on NiTi alloy wires. Initially, the coatings exhibited a nonuniform surface and microcracking. Upon sintering, the surface of the coatings became smooth due to viscous flow of the polymer.