The B50Ca50 glass composition did not show crystallization of the HAP after 30 days of dipping in SBF. Gu et al. (Gu et al., 2011) reported in the Ca-Na-B ternary glass system that the CaO:B_2O_3 molar ratio affects the morphology and particle size of the HAP, but had little effect on the kinetics of conversion to HAP. The average size of HAP particles decreased with increasing CaO content in a glass. Compared to melt quench, sol-gel-derived glasses showed higher specific surface area values and porosity, enhancing the solubility and leading to better bioactivity. The sol-gel prepared borate glasses (B_2O_3-CaO-Na_2O-P_2O_5) demonstrated at least a 25-fold increase in HAP conversion rates when compared to melt derived equivalents (Lepry and Nazhat, 2015). Borate glasses containing fluoride anion in SBF formed a fluorapatite layer on the glass surface (Abdelghany and Kamal, 2014). Fluorapatite is considered as a potential biomaterial for bone repair due to bioactive, biocompatible, and antimicrobial activity (Eslami et al., 2009; Stanić et al., 2014, 2015). It is more thermodynamically stable and has a lower solubility in an acidic medium than HAP. Fluorapatite biomaterials showed antibacterial activities but not the biocidal effect (Stanić et al., 2014, 2015). Properties of a phosphate solution, such as concentration and temperature, have an influence on the rate of formation of the HAP layer on the surface of a glass (Lepry and Nazhat, 2015; Yao et al., 2010; Gu et al., 2011; Han and Day, 2007). A higher content of phosphate ions in a solution increases the rate of HAP formation (Lepry and Nazhat, 2015). Several studies have reported about synthesis of hollow particles from borate glasses (Yao et al., 2010; Wang et al., 2006, 2007; Xiao et al., 2013). The change of the phosphate concentration in the solution can control the microstructure development of the hollow HAP microsphere (Yao et al., 2010). The rate of reaction is slower at lower phosphate concentrations in solution that allow obtaining multilayer hollow microsphere (Fig. 8.3) (Yao et al., 2010). Hollow particles are promising for use in medicine for transport and controlled drug or growth factor release (Xiao et al., 2013; Wang et al., 2007).

An increase in temperature of phosphate solution increases the reaction rate transformation of borate glasses to HAP. Han et al. (Han and Day, 2007) showed that the HAP crystal size increases and grain shape changes from spheroidal to cylindrical as the temperature increases from 37°C to 200°C. Mechanisms for converting borosilicate glasses to HAP similar to those for bioactive silicate glasses with the exception that the present alkali oxides and B_2O_3 are completely released into the solution (Huang et al., 2006). Borosilicate glasses were only partially converted, giving a composite structure consisting of an SiO_2-rich core surrounded by an HAP layer. The rate of conversion of glass to HAP increases with the increasing amount of B_2O_3.

In vitro test interactions between bioactive glass and a cell culture line are intended to simulate and predict the biological response of cells and tissues to the presence of material in the body. These tests are designed to provide the possibility of determining the toxicity and the ability of a contact between the cells and material. Contact between the cells and glass materials can be accomplished