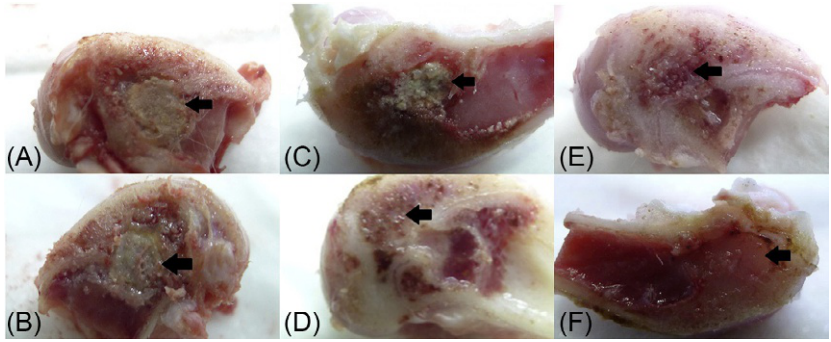

FIG. 8.5 Optical images of the cross sections of rabbit femoral condyles implanted with bioactive borate glass/chitosan cement at 4 weeks (A), 8 weeks (C), and 12 weeks (E) and with calcium sulfate cement for 4 weeks (B), 8 weeks (D), and 12 weeks (F) *(arrows indicate the implant). (Cui, X., Huang, W., Zhang, Y., Wang, T., Zhou, J., Wang, H., et al., 2017. Evaluation of an injectable bioactive borate glass cement to heal bone defects in a rabbit femoral condyle model. Mater. Sci. Eng. C 73, 585–595).*

growth, and repair of the bone and wound healing. Many nonessential metal ions are used for therapeutic purposes or are subject to various biological examinations. Metal ions in bioactive glasses can cause changes in the crystal structure, specific surface, thermal stability, morphology, solubility, and chemical and biological properties.

8.3.1 Silver-Doped Boron-Containing Bioactive Glass

Postsurgical infections associated with the presence of implant biomaterials are significant because of their morbidity and usually require their removal (Campoccia et al., 2006). To solve the problem of infections, it has been proposed to use antimicrobial agents such as antibiotics, fluorine, and biocides metal ions (Stanić et al., 2014, 2015, 2011; Montali, 2006). Silver ions have expressed an oligodynamic effect with a minimal development of microorganism resistance. Low concentrations of silver ions are nontoxic to man, but high concentrations can cause cytotoxicity and lead to argyria (Hidalgo and Domínguez, 1998; Kim et al., 2010). There are several reports on the synthesis of boron-containing glasses by the melt quenching technique (Magyari et al., 2014; Lucacel et al., 2014; Coelho et al., 2012; Miola et al., 2015; Luo et al., 2010; Xiao et al., 2012). This technique is not the most appropriate for the synthesis of Ag-doped BBG, because it leads to the development of metal Ag as a secondary phase. Silver ions cause significant structural changes in bioactive glasses. Magyari et al. reported that the addition of 1.5–2 mol% Ag_2O to the initial glass ($10B_2O_3{\cdot}30Na_2O{\cdot}60P_2O_5$) induces important changes to the network by creating pyroborate and pentaborate groups (Magyari et al., 2014). Bioactive glasses with compositions of $xAg_2O(100-x)[1.5B_2O_3{\cdot}SiO_2{\cdot}CaO]$ with $x=0-3$ mol% have structures, mainly built by tetrahedral ($B\emptyset_4^-$), triangular ($B\emptyset_3$ and $B\emptyset_2O^-$)