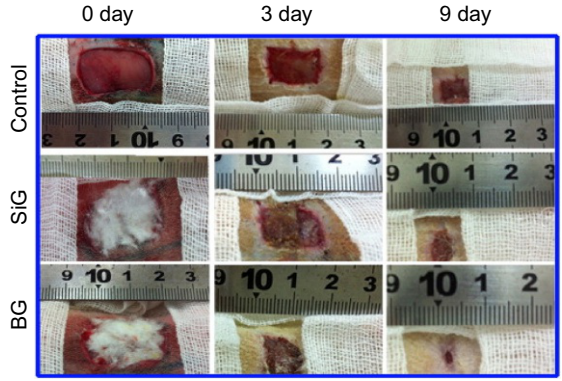

FIG. 5.6 Images of skin wounds treated with borate glass (BG), Bioglass (SIG) microfiber and wound dressings and control (untreated) for 0, 3, and 9 days (Zhou et al., 2016).

porous structure was mechanically stable and mimicked porous bone structure. Nitridation enhanced the bioactivity of the borosilicate glass by facilitating its resorption and the deposition of apatite (bone-like mineral) on its surface. To promote bone regeneration, the scaffold must be highly porous with a high degree of pore interconnectivity, but it must maintain mechanical integrity. The Nitridation of the borosilicate glass increased its reactivity and bioactivity, hence facilitating the deposition of bone-like apatite on its surface. The nitridated surface also improved the connectivity of the glass with the bone skin cells that have been found to better adhere and differentiate on the surface of the nitridated borosilicate glass (Orgaz et al., 2016).

The bioactivity of borate and borosilicate glass can be assessed by the rate of formation of HA onto their surface, whereas the HA deposition can take weeks but heavily depends on the composition of the glass. Owing to the immediate and controllable formation of HA, bioactive glass containing B_2O_3 is an attractive candidate for the fabrication of scaffolds. In addition, some borate/borosilicate glass is known to sinter more rapidly than the Bioglass, thus providing an easily sinterable bioactive glass system for producing scaffolds (Fu et al., 2010).

A study was performed to monitor the release of copper (Cu) ions from the scaffolds of bioactive silicate glass and its effect on the skin cells, bone regeneration, and angiogenesis was studied. The scaffolds containing differing concentrations of Cu (0–2.0 wt% CuO) were made up of a grid-like microstructure by robotic deposition. Immersion of scaffolds in SBF resulted in a controlled release of Cu ions and deposition of HA onto the surface. The proliferation and ALP activity of preosteoblastic MC3T3-E1 skin cells cultured on the scaffolds were not adversely effected by 0.4 and 0.8 wt% CuO in the glass; however, considerable reduction in cell activity and proliferation was observed in the presence of higher concentration of Cu, 2.0 wt% CuO. The new blood vessel that infiltrated the scaffolds increased with CuO content and was significantly