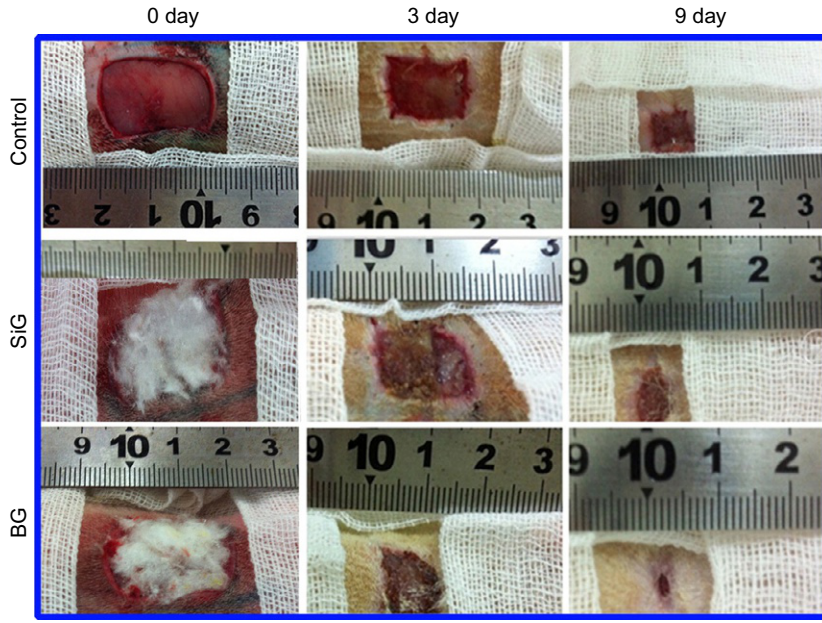

FIG. 8.7 Images of skin wounds treated with borate glass 13-93B3 (BG) and 45S5 Bioglass (SiG) microfiber wound dressings for 0, 3, and 9 days, and the untreated wound surfaces (Control). *(Zhou, J., Wang, H., Zhao, S., Zhou, N., Wang, D., Zhang, C., 2016. In vivo and in vitro studies of borate based glassmicro-fibers for dermal repairing. Mater. Sci. Eng. C 60, 437–445).*

and Cu of the Cu-doped (0–3.0 wt% CuO) borate bioactive glass (13-93B3) microfiber was not toxic to human umbilical vein endothelial cells (HUVECs) and fibroblasts in vitro. The ionic dissolution product stimulated HUVEC migration, tubule formation, VEGF secretion, and levels of expression angiogenic-related genes of fibroblasts in a manner that increased with an increase in Cu in the microfibers. An in vivo study showed that Cu-doped and undoped fibers showed improved collagen deposition, maturity, and orientation when compared to the untreated skin defects in rats. The improvement shown by the Cu-doped fibers was not significantly better than the undoped fibers at 14 days postsurgery. The Cu-doped fibers (3.0 wt% CuO) showed a notably better capacity to stimulate angiogenesis than the undoped fibers and the untreated defects (control) at 7 and 14 days postsurgery. Lin et al. (Lin et al., 2014) found that the Cu-doped 13-93B3 microfibers (0.4 wt% CuO) promoted extensive angiogenesis as compared to 45S5 silica glass after 4 weeks of subcutaneous implantation in rats. Ma et al. (Ma et al., 2014) prepared antimicrobial gelatin/chitosan/borate glass [30.0 SiO_2, 27.0 CaO, 20.0 B_2O_3, 4.0 P_2O_5, 1.5 CuO, 1.0 ZnO, 3.0 K_2O, and 9.0 Na_2O (wt%)] composites for treatment of wounds. The borate glasses showed antibacterial activity against *Actinomyces viscosus* and *E. coli*. The composites did not cause inflammation of the surrounding tissue and are fully degraded by the subcutaneous tissue of rats after 4 weeks postoperation.