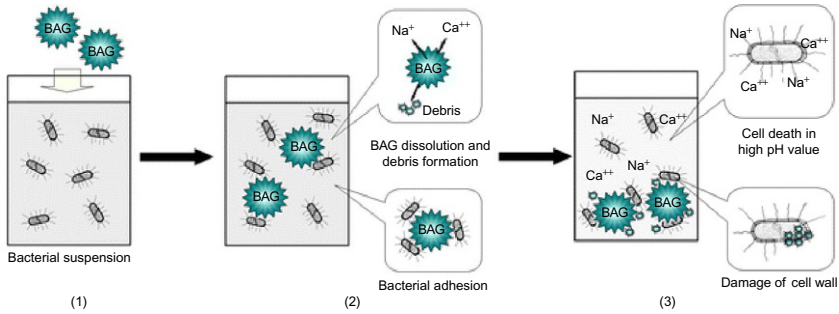

FIG. 14.6 A schematic illustration of the bactericidal process of 45S5 BAG. (1) BAG particles are added into bacterial suspension. (2) After immersion into bacterial suspension, BAG particles dissolution leads to an increase of aqueous pH value and debris formation. Bacteria adhere on the surface of BAG particles simultaneously. (3) Bacteria are killed by the high aqueous pH value and the damage of cell walls caused by BAG debris (Hu et al., 2009).

In a study conducted by Kankare and Lindfors (2016), three patients diagnosed with spondylodiscitis caused by three different pathogens (*Mycobacterium tuberculosis*, *Candida tropicalis*, and *S. aureus*) were treated using an expandable replacement device and BG S53P4. The authors reported that all patients had their infection treated and neurological recovery, without relapses, complications, or reinfections. Another study carried out by Geurts et al. (2016) evaluated the use of BG (S53P4) in a one-stage treatment through the filling of bone injury with BG after the debridement of the osteomyelitic lesion, as a substitute of two-stage gold standard treatment with intermittent administration of gentamicin beads. According to the authors, fifteen patients were included in the study, and all of them had eradication of infection, with normalization of inflammatory parameters, and repair of bone lesions. After these outcomes, a treatment protocol based on BGs was established at the Department of Orthopaedic Surgery—Maastricht University Medical Centre in Netherlands, where the studies were conducted.

Soft tissues are also treated using the antibacterial activity of BGs. Zhou et al. (2017) prepared fish collagen/BG (Col/BG) nanofibers by electrospin, and used as a skin wound dressing. Among the properties analyzed by authors, antibacterial activity against *S. aureus* showed that Col/BG nanofibers could inhibit adhesion when compared with Col nanofibers or cover slips used as control (Fig. 14.7). According to the authors, fish collagen/BG could form multifunctional and biomimetic nanofibers, which were able to induce skin regeneration with a potential antibacterial activity.

14.2.2 Antibacterial Activities of Doped BG

Biomaterials have been doped with antibacterial ions to treat bactericidal infections. In relation to bactericidal infections of the bone tissue, bioactive or resorbable bioceramics are the most suggested materials to treat such infections,