When used as powder, the glass particles and the drug are mixed, and then the antibiotic is loaded on the glass surface. If used as pellets, the particles and the drug are also mixed and then pressed to cast pellets (Meseguer-Olmo et al., 2002). As scaffolds, porous structures are made by using particulate glasses, and the drug is loaded within the pores.

Since scaffolds mimic the bone structure, allowing the development of neovascularization, osteointegration, and blood supply for cell growth, as well as favoring drug loading in the pores, particulate glasses are more likely to be used as such. Soundrapandian et al. (2010) have pointed out that drug release may be affected by variables such as scaffold size, drug concentration, and dissolution medium, which may all be taken into account. These authors evaluated the release of gemifloxacin and fluconazole from BG scaffolds, and showed that the drug could be released up to 43 days, which evidences the potential use of these scaffolds and its effectiveness in releasing drugs for long periods.

Similar to scaffolds, mesoporous structures also allow drug loading within the pores, which in turn improves sustained drug release. In addition, mesoporous BGs can have their pores surface modified with APTES (3-aminopropyltriethoxysilane) in order to improve intermolecular interaction with the drugs within the pores (Jiang et al., 2017). Jiang et al. (2017) developed an amino-functionalized mesoporous BG (N-MBG) and studied drug release patterns comparing these glasses with nonfunctionalized MBG. The authors showed that N-MBG presented an increased surface area and higher loading capacity than MBG, promoting a more sustained release. The authors concluded that amino-functionalized mesoporous BG is a promising candidate for the drug delivery system.

Regarding glass composition, it is not only silicate glasses that have been developed for drug delivery, but also borate glasses, and both kind of glasses have shown interesting results. Borate glass was used in in vivo studies by Xie et al. (2009). They induced infections by methicillin-resistant *S. aureus* in the tibia of rabbits, and then treated this infection with pure borate glass, vancomycin-loaded calcium sulfate, and vancomycin-loaded borate glass. The authors observed that vancomycin-loaded borate glass exhibited excellent compatibility, with a higher reabsorption rate, and replacement of bone loss without leading to foreign body response. Furthermore, vancomycin-loaded borate glass eradicated osteomyelitis, while vancomycin-loaded calcium sulfate presented total reabsorption with little formation of new bone and evident foreign body response, demonstrating the potential of vancomycin-loaded borate glass of stimulating bone regeneration and eliminating osteomyelitis simultaneously. Liu et al. (2010) used borate BG scaffolds to deliver vancomycin. They performed in vivo experiments through implanting the scaffolds into the tibia of rabbits containing osteomyelitis infection. Histological and microbiological findings showed the efficacy of osteomyelitis treatment. These authors also conducted a bioactivity test in SBF solution, and showed that the formation of hydroxyapatite on the glass surface improved the release of vancomycin. In Fig. 14.11, it is possible to observe the changes in the glass surface as the glass interacted with SBF solution.