Each of the materials presented in this section could be used for the treatment of bone cancer in the form of powders, scaffolds, or cements. These materials could offer valuable additional treatments for cancer patients via magnetic induction hyperthermia.

2.8 APPLICATIONS FOR CLINICAL IMAGING AND BIOLABELING

In addition to investigations of the therapeutic treatment of a variety of pathological conditions, bioactive glasses have shown an emerging potential for diagnostic applications. Injectable composite cements comprising polymeric or bioceramic matrix and a zirconia-containing MBG phase were recently patented (Vitale-Brovarone et al., 2015). These particular type of bioactive glass particles (dispersed in the cement) not only promote bone regeneration in vertebral fractures, but also act as a radiopaque agent that allows improved visualization of the different bone/cement structures and interfaces under radiographic imaging (Tallia et al., 2014).

It was also noted that mesoporous glasses doped with rare earth elements retain an excellent bioactivity and acquire photoluminescent properties under UV irradiation. The emission intensity of drug-loaded MBGs change with the cumulative released amount of drug. Therefore, the extent of drug uptake and release can be easily monitored and tracked by the change of luminescence. Studies of MBG powder (Lin et al., 2009; Fan et al., 2011; Miao et al., 2014) and scaffolds (Wu et al., 2016) doped with Eu^{3+} and releasing ibuprofen were reported in the literature. Europium, characterized by 4f-4f intraorbital electronic transitions, which span both the visible and near-infrared ranges offers prolonged excited states and allows time-resolved detection, a key advantage for bioassays and biological luminescence imaging (Bunzli, 2010). Early biocompatibility studies suggest a very mild toxicity of Eu^{3+} ions released in vivo (mouse model) (Patra et al., 2009). Furthermore, there is preliminary evidence that, besides being exploited for biolabelling function, Eu^{3+} can promote bone tissue mineralization (Mawani et al., 2013; Mawani and Orvig, 2014) and angiogenesis (Patra et al., 2008).

2.9 SUMMARY

This chapter has presented an insight into the current potential of known bioglasses, from active and passive antibacterial properties to targeted drug delivery, and enhanced healing and tissue regeneration. The research to date has provided many exciting opportunities for researchers and medical professionals to find more functional, efficient, or more cost-effective treatments. The existing medical applications are yet to be fully exploited despite their potential to promote effective healing, with significant reductions in social and healthcare costs.