However, it is worth noting here that despite similar preparation protocols, concentrations of the precursors, nature and concentrations of the solvents used were variable. CTAB concentration therefore, is not the only parameter influencing particle morphology and structure. Thus, considering this, further systematic enquiries are warranted if one is to fully realize the role and subsequent influence of altering individual parameters on particle morphology. It may be stated here that although all bioactive glasses prepared via the sol-gel route acquire an inherent mesoporosity, the combination of this process with surfactant supramolecular chemistry allows for the realization of an ordered mesoporous structure that will ultimately translate to more predictable and tailored reproductions of bioactive glass templates for bespoke hard tissue defect resolution in vivo according to its site, size, and shape.

18.6 APPLICATION OF BIOACTIVE GLASS IN BIOMEDICAL SCIENCES

18.6.1 Dentistry

In the biomaterial science, oral cavity is extremely complex and a challenging environment since it includes both soft and hard tissues in an environment where microorganisms are present. Several studies show that a proper material that can be used in bone replacement applications should have the following properties:

- Easy for handling.
- It is not a toxic or does not lead to a foreign body reaction.
- It should avoid chances for transmission of infectious diseases.
- There should be no donor site morbidity.
- The material should be economical with no additional cost or prolong the operation time.

Due to the ability of bioactive glass to support bonding and adherence to the biological tissues, simulate the growth of tissues, inhabit the growth of microorganisms, and have the appropriate biomechanical properties such as strength, stuffiness, and hardness, it is considered as a promising material for dental applications (see Fig. 18.3) (Profeta and Prucher, 2015).

18.6.1.1 Treatment of Dental Hypersensitivity

The sharp pain of dental hypersensitivity is due to the flow of fluid through the opened dentinal tubules into the pulp of the tooth. Aqueous solutions or pastes that contain fine grained particles of S53P4 bioactive glass was used to treat the dental hypersensitivity. Other studies also examined the effect of 45S5 bioactive glass on the hypersensitivity. It was found that the opened tubules were sealed with an HAP participate. Therefore, the level of hypersensitivity decreased. In addition, the bioactive glass in the form of powder can be used to strengthen the