



FIG. 17.1 SEM images of demineralized enamel showing the central defect of a demineralized crystal (A) and CPP-ACFP-remineralized enamel crystal (B), where the central defect (marked with an arrow) has been substantially restored (Cochrane et al., 2010).

of innovations, a few strategies have been used to synthesize HA including high gravity precipitation, chemical precipitation, wet chemical deposition, biomimetic deposition, and sol-gel technique (Khan et al., 2008; Feng et al., 2005; Lickorish et al., 2004; Monmaturapoj, 2008; Nathanael et al., 2011; Nazir et al., 2013; Yang et al., 2004). HA has many advantages however the fundamental downside is poor mechanical properties. It has low impact strength, durability, and cannot withstand tensile forces in mass. To upgrade the fracture toughness, sinterability, and to decrease porosity of HA, whiskers and fibrous hydroxyapatite have been used. It is accounted for that HA filler as whiskers enhanced wettability and strengthening capability of dental composites more than nano-HA particles (Zhang and Darvell, 2012).

The nano-filler particles are effectively blended with dental resins to a high extent because of their high surface area and these filler particles would offer an enhanced mechanical interlocking with the polymer matrix. Domingo et al. (2001, 2003) reported that dental composites containing nanometric particles of HA as filler are unsatisfactory for clinical use and are hydrolytically unstable. However, recently silanized nano-HA were incorporated in dental resins and it was found that their mechanical and physical properties are better than commercial composites (Lung et al., 2016).

Due to its composition, structure, and bioactive properties, HA has been widely used for biomedical applications such as supporting hard tissue formation when used in orthopedic, infrabony defects, maxillofacial applications, hip and joint prosthesis, for ridge augmentation, dental implant coatings, remineralizing agent in dental restorative materials, and drug delivery (Agrawal and Prakash, 2011).