

# Recovering value from waste: biomaterials production from marine shell waste

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**Abstract.** Marine shell waste is rich in calcium carbonate ( $\text{CaCO}_3$ ), which can be a good source for the synthesis of hydroxyapatite (HAP). HAP is a potential component in bone tissue engineering as it possesses similar elements to bone structure. In this study, three different species of marine shells that are normally found in Malaysia, namely short-necked clam (*Paphia undulate*), blood cockle (*Anadara granosa*) and hard clam (*Meretrix lyrata*) were used to produce  $\text{CaCO}_3$  and HAP. The characterization results indicate that the produced  $\text{CaCO}_3$  consists of mainly aragonite polymorph. Subsequently, the produced  $\text{CaCO}_3$  was used as the calcium source for the formation of HAP through the wet slurry precipitation method. The results from the analyses on crystallinity, functional group, surface morphology and elemental analysis of the synthesized HAP powders that were obtained through X-ray diffraction (XRD), Fourier-transform infrared (FTIR), scanning electron microscopy (SEM) and energy-dispersive X-ray (EDX) have confirmed that HAP is comparable with other studies. Overall, the results obtained through this study indicate that it is possible to produce  $\text{CaCO}_3$  and HAP from various marine-based shell waste through greener synthesis routes with less chemicals and reaction time.

**Keywords.** Hydroxyapatite; calcium carbonate; marine shell; wet slurry precipitation method; biomaterials.