

## Synthesis and characterisation of calcium carbonate aragonite nanocrystals from cockle shell powder (*Anadara granosa*)

### ABSTRACT

The synthesis of pure calcium carbonate nanocrystals using a high pressure homogeniser (HPH) via a microemulsion system produced uniform nanosized particles, which were characterised using transmission electron microscopy (TEM), field-emission scanning electron microscopy (FESEM), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), and thermogravimetric analysis (TGA). The identified particles were aragonite polymorphs with a rod shape and were approximately 50 nm in size. The aragonite polymorph of calcium carbonate was prepared from biogenic materials, cockle shells, and exhibited unique characteristics (i.e., a higher density than that of calcite), which makes it biocompatible and potentially suitable for applications in the medical, pharmaceutical, cosmetic, and paint industries. The methods adopted and the nonionic surfactant used in the synthesis of calcium carbonate nanocrystalline aragonite polymorphs were environmentally friendly and can be scaled up for industrial production. The sources are naturally available materials that are by-products of the seafood industry, which offers an opportunity for exploitation in numerous industrial applications.

**Keyword:** Calcium carbonate nanocrystals; Cockle shell powder