

ABSTRACT

Pigments are colored solid materials that impart both color and optical properties to various applications such as paints, coatings, and ceramics. Currently, the development of environmentally friendly pigments is gaining significant attention, particularly for reflective coatings that can reduce heat absorption and enhance the energy efficiency of buildings. In this study, the potential of an ultrasound-assisted green synthesis approach was explored to produce Bismuth Ferrite (BFO) as an eco-friendly near-infrared reflective pigment. The synthesis was carried out using *Clitoria ternatea* flower extract with systematically controlled calcination temperatures. The active phytochemical components and strong antioxidant activity of *Clitoria ternatea* extract, combined with optimized calcination conditions, played a crucial role in promoting the formation of the sillenite phase in BFO. X-ray diffraction patterns confirmed that the sillenite BFO phase was fully formed at 600 °C. Meanwhile, transmission electron microscopy (TEM) and zeta potential analyses revealed a uniform and well-dispersed nanostructured morphology. The resulting sillenite BFO pigment exhibited a bright yellow color with excellent chromatic stability and superior near-infrared reflectance. Overall, this study demonstrates that the ultrasound-assisted green synthesis method can effectively produce reflective nanopigments with strong potential for application in eco-friendly and energy-efficient coatings.

Keywords: Bismuth Ferrite, *Clitoria ternatea* Extract, Calcination Temperature, Green Synthesis, Reflective Pigment.