

## **Development of a Novel Composite Tile using Meetiyagoda Kaolinite Reinforced with Polylactic Acid (PLA)**

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Sri Lanka has high quality Kaolinite deposit in Meetiyagoda that govern by the Lanka Ceramic PLC and refined kaolinite has provided to the local ceramic industries. Kaolinite, is a layered silicate clay mineral composed with low shrink–swell capacity and cation-exchange capacity. Mostly ceramic tile production is suffering with cracking, low strength, high weight and less waterproof capacity. Hence, ceramic tile industry has been updating with product advancement gradually since last decades. Specially, the evolution of tile body formulations and technological behavior of clay composite materials have taken in to attention. This trend has taken step forward with introducing novel composites by mixing polymer materials with raw materials. Polylactic Acid (PLA) is a blend composite having low stiffness, high tensile strength and high gas permeability. Therefore, the present study is focused on develop a composite material by mixing PLA and kaolin in order to obtain low weight, high strength and waterproof ceramic tiles. Initially Kaolin samples were collected from Meetiyagoda Kaolinite deposit and all the samples were tested for moisture content & were subjected to physical purification by mixing with distilled water and obtained a milky color clay solution. After that dried clay samples were powdered and 125 micron size fraction was obtained by mechanical sieving. Then while PLA was heating to its melting temperature (170<sup>0</sup>C), kaolinite was added time to time (ratio in 50:50) into PLA container and mixed using a heat stirrer in 170<sup>0</sup>C for 30 min to develop a slurry which then set up in a mould. Then the prepared novel composite tile sample was tested on water absorption, compressive strength & crystal structure was tested by using the X-Ray diffraction (XRD).As an overall result the novel tile sample shows almost 0% water absorption with time and also it is very light in weight with a considerable amount of strength. This novel tile can be developed with low temperature (170<sup>0</sup>C). Therefore, the product is cost effective. Future of this research can be directed to enhance more properties based on what material used to reinforce the kaolinite (Ex: Glass fiber, Silica, graphite) and we can use this reinforced kaolinite as a raw material to develop a novel cement (plaster) to apply in building constructions.

**Keywords:** Kaolinite; PLA; Novel reinforced tile; Water absorption