

Utilization of Solid Waste Materials to Produce Glass-Ceramic Tiles

Authors : Sonjida Mustafia

Abstract : Glass-ceramic is a material that contains both the properties of glass and ceramic within. They always contain a residual glassy phase and one or more embedded crystalline phases. Ceramic tiles are very popular in the world because of their high structural strength, low absorption, increased hygiene, and hot and cold insulation. Glass-ceramic materials are used to produce marble-like floor and wall tiles. There are a huge amount of waste materials like rice husk ash (RHA), waste iron, waste glass, and other industrial solid waste in Bangladesh, which can be used to produce glass-ceramic floor and wall tiles. The raw materials (rice husk ash, waste glass, and k-feldspar) are a mixture, and the mixture is melted to form glass frit at 1175°C. The frits are grained to require fine particle size. The powder is moistened in 7-8% water with sodium silicate. The green glass-ceramic tiles were fired at different temperatures (800-1100°C) for a soaking time of 1 hour to form glass-ceramic tiles and to study the sintering-crystallization process. The results reveal that the modulus of rupture increases with increasing sintering temperature and reaches the highest value (95.25Mpa) at 925°C. Glossiness and linear shrinkage increase with increasing temperature.

Keywords : rice husk ash, waste glass, glass-ceramic, modulus of rupture, glossiness, linear shrinkage, micro-structure

Conference Title : ICC 2023 : International Conference on Ceramics

Conference Location : Jeddah, Saudi Arabia

Conference Dates : November 20-21, 2023