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Development of TiO₂ White Glazes for Ceramic Tiles: Influence of Glaze Melting and Application

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Based on a previous work, the objective of this study was to determine the effect of melting and application conditions of an anatase glaze used to promote white opacity in ceramic tile coatings. An anatase frit (10%wt TiO₂) was melted at 1480°C and 1530°C for 60min and 90min and quenched in water. Each frit was ground (15min) in eccentric mill with the addition of 10% of kaolin, 0.2% of sodium tripolyphosphate, 0.2% of carboxymethylcellulose and 30% of water, forming glaze slurries with 1.80g/cm³ density and viscosity of 50s in cup Ford n°4. The glazes were applied in layers of 0.4mm thickness over previously engobed tiles. The tiles were fired at 900°C, 1000°C, 1100° and 1190°C for 40min in a laboratory roller kiln. The color of all the glazes was analyzed by spectrophotometry (400nm to 700nm) and the formed phases by x-ray diffraction (XRD CuKα) and scanning electronic microscopy (SEM). The results showed the frit fired at 1100°C obtained from the frit melted at 1530°C for 60min formed a totally white glaze with great coating capacity. The results of scanning electron microscopy and X-ray diffraction revealed that the opacity is caused by tiny rutile crystals developed as function of melting and application temperature.

Keywords: TiO₂ glazes, white opacity, anatase frits, thermal treatment.