

Study on the Preparation of Apatite and Titanium Dioxide Composite Powder and its Application as Ceramic Opacifier

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In this paper, a kind of special composite structure powder produced by grinding apatite minerals and titanium dioxide in water medium was studied as a sanitary ceramic opacifier. According to scanning electron microscope (SEM) and Infrared Spectroscopy (IR) test, titanium dioxide evenly distributed on the surface of apatite minerals in the composite powder, and it revealed that these two kinds of particles are connected by not only strong static attraction but also chemical bonding. The powder can be used to replace the equal proportion of zirconium silicate in the production of sanitary ceramic products, and it was found that the appearance of ceramic products was wonderful smooth and pretty white, and some samples' whiteness value was beyond 90, and the most B values of CIE were less than 3.0. The X ray diffraction (XRD) test results of enamel showed that the glaze materials added in the composite particles can separate out sphene crystal(CaTiSiO₅) after ceramic firing, and scanning electron microscope results (SEM) showed that the particles' size of the precipitated crystals mainly between 0.3~0.5 μ m, and the particles have uniform shape and uniform distribution. The experimental results show that the optimum mass percentage of the composite particles is 35%, and TiO₂ is about 65%, and the best proportion of the composite particles in the glaze materials is between 8.5%~12.0%. These composite particles used as opacifier can achieve a good opaque performance, and more importantly, it can replace zirconium silicate which always introducing radioactive elements in ceramic products.