

Research title Ceramic Color Pigment: Synthesis and Stability in Various Glazes for Artist's guideline

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Abstract

The inorganic color pigments based on the spinel system, $\text{Zn(Al,Cr)}_2\text{O}_4$, have been synthesized by solid-state processing. Solid solution formation was examined by X-ray Diffraction (XRD), Infrared Spectroscopy (IR) and Raman Spectroscopy. The color of the pigments, characterized by CIELab system, gradually changed from the pink tone to the green tone with increasing amount of chromium. Shifting of the peak in UV-vis spectra was also observed to be in a similar trend. The pigment particles appeared to be well-crystallized with octahedral shape typical of a spinel structure. Different glazes used for color stability testing were of matt and celadon types, representatives commonly employed in the ceramic industry and artists. Slight color changes toward the greenish and grayish tones were observed for all compositions. These alterations could be associated with strong interaction between the pigments and the molten glazes. Electron Microscopy displayed visible interaction layer at the interface. Chromium was observed to diffuse out into the glaze possibly due to the aggressive nature of the glaze at the molten state. Some foreign species were also detected inside the pigment entity. The results from this study could prove useful for the design of unique glaze formula specially tailored and chemically suitable for these spinel pigments.

Keywords

Color pigment, Spinel, Solid-state reaction, Color Stability