

عنوان مقاله:

Effect of post heating on the phase transformation of FeCr_2O_4 to $(\text{Fe,Cr})_2\text{O}_3$ solid solution pigment powders

محل انتشار:

سیزدهمین کنگره سرامیک ایران و سومین کنفرانس بین المللی سرامیک ایران (سال: 1401)

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نویسندگان:

Fatemeh Paborji - *Department of Materials Engineering, Faculty of Engineering, University of Sistan and Baluchestan, Zahedan, Iran*

Mahdi Shafiee Afarani - *Department of Materials Engineering, Faculty of Engineering, University of Sistan and Baluchestan, Zahedan, Iran*

Amir Masoud Arabi - *Department of Inorganic Pigments and Glazes, Institute for Color Science and Technology (ICST), Tehran, Iran*

Mehdi Ghahari - *Department of Nano Materials and Nano Coatings, Institute for Color Science and Technology (ICST), Tehran, Iran*

خلاصه مقاله:

Iron chromite was synthesized via solution combustion route using Iron (III) nitrate nonahydrate and Chromium (III) nitrate nonahydrate as starting materials, as well as Glycine-Urea, Glycine-Citric acid, and Glycine-Ethylene glycol mixtures as fuels. The effect of post heating at different temperatures on the structure, molecular, microstructure and chromatic properties of powders was studied. The X-ray diffraction (XRD) patterns showed that as synthesized powders were obtained in crystalline FeCr_2O_4 phases. Moreover, post heating of the powders led to d-space shift and oxidation and formation of $(\text{Fe,Cr})_2\text{O}_3$ solid solution phase regardless of fuel type. Phase transformation of FeCr_2O_4 to $(\text{Fe,Cr})_2\text{O}_3$ solid solution was observed at $500/750^\circ\text{C}$ depending of dominant phase of as synthesized particles. Fourier transform infrared (FTIR) analysis illustrated that band position of octahedral M-O and tetrahedral M-O bonds were shifted due to Fe cations movement from their position and lattice shrinkage by increasing of post heating temperature. Moreover, scanning electron micrographs showed that $\text{Fe}_{0.7}\text{Cr}_{1.3}\text{O}_3$ semi spherical fine particles were formed from porous spongy FeCr_2O_4 particles due to oxidation and phase transformation during the postheating. Furthermore, chromatic properties of the samples were represented. The color properties of the pigments showed that the formation of brown pigments is provided with the phase transformation from FeCr_2O_4 to $(\text{Fe,Cr})_2\text{O}_3$ in the temperature range of 750°C . Also, increasing the color purity to this temperature is related to the removal of residual carbonaceous matters. The best sample prepared at this temperature has the following specifications: $a^* = 8.81$, $b^* = 18.94$ & $L^* = 23.7$, which can be considered as a suitable candidate for brown ceramic pigment

کلمات کلیدی:

.Iron chromite, post heating, Chromatic properties, phase transformation

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