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Pigments Inorganic Of $Li_2Zn_{1-3X/2}Fe_XTi_3O_8$ e $Li_2Zn_{1-3X}Cr_XTi_3O_8$; $Li_{2-x}Zn_{1-x}Pr_xTi_3O_8$ and $Li_{2-x}Zn_{1-x}Nd_xTi_3O_8$: Effect of doping

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Abstract : In this work were developed for inorganic pigments of lithium titanates with spinel structure by the modified Pechini method. The pure compound $Li_2ZnTi_3O_8$ was doped Fe^{+3}, Cr^{+3}, Pr^{+3} and Nd^{+3}. After calcination, the powders were characterized by techniques: XRD, BET, UV-Visible and colorimetry. Results of XRD showed that the pigments calcined at low temperature proved to be crystalline and stoichiometric. The UV-Visible measures showed the interaction of the modifiers Fe^{+3}, Cr^{+3}, Pr^{+3} and Nd^{+3}i n the structure of pigments, showing that the increase of doping in the two compounds provided a more stable compared with the pure systems Figure 1 and 2. The transition metals *f* Pr^{+3} and Nd^{+3}, provide relevant property in relation to the transition metal *d* Fe^{+3}, Cr^{+3}. The doped pigment had a higher surface area (67g/m2) for pure pigments (5g/m2). The properties acquired by the systems have been synthesized through the balancing charge / mass of metal doping and the route of synthesis.

Spinel-type oxides ($Me^{2+}Me^{3+}O_4$) represent one of the most studied classes of materials in solid-state science, because of their relevant magnetic, refractory, semiconducting, and coloring properties. They are stable even under drastic thermal and redox industrial treatments. The incorporation of transition metal (TM) ions into stable diamagnetic spinels is a successful process to obtain materials with peculiar physical properties and, sometimes, very intense colors. The coloring properties of spinels obtained by this approach are mainly determined by the crystal field surrounding the TM ion, i.e. by its d–d and/or charge transfer transitions. A large number of cations can be accommodated in the spinel structure.[1] Moreover; these cations can occupy two types of sites, T, tetrahedral, or O, octahedral. All distribution ratios are allowed in spinels, from the *normal* type (Me^{3+} in the O sites) to the *inverse* type (Me^{2+} in one half of the O sites), depending on chemical composition and temperature. The possible presence of several TM cations in different coordination accounts for the variety of colors that can be obtained.

The synthesis of new inorganic pigments has been investigated with emphasis on the preparation of heat-resistant pigments by high-temperature calcination of $Li_2Zn_{1-3X/2}Fe_XTi_3O_8$ e $Li_2Zn_{1-3X}Cr_XTi_3O_8$; $Li_{2-x}Zn_{1-x}Pr_xTi_3O_8$ and $Li_{2-x}Zn_{1-x}Nd_xTi_3O_8$ spinels as well as on the determination of optimum conditions for pigment formation. The resulting pigments were examined for their structure, color and ability to dye ceramic glazes.In this context, the main goal of the present study was to synthesize pigments from polymeric precursors using the method proposed by Pechini. In particular, doped $Li_2Zn(M)Ti_3O_8$ spinels (M= Fe^{+3}, Cr^{+3}, Pr^{+3} and Nd^{+3}) were addressed. Synthesis was carried out in conventional resistive furnace and thoroughly characterized in an attempt to establish the spectroscopic properties of the pigments obtained. $Li_2Zn_{1-3X/2}Fe_XTi_3O_8$ e $Li_2Zn_{1-3X}Cr_XTi_3O_8$; $Li_{2-x}Zn_{1-x}Pr_xTi_3O_8$ and $Li_{2-x}Zn_{1-x}Nd_xTi_3O_8$ were successfully produced.

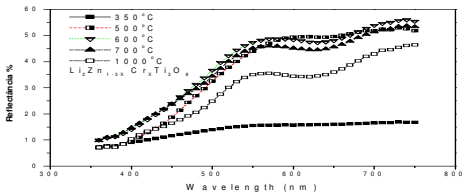

Figure 1

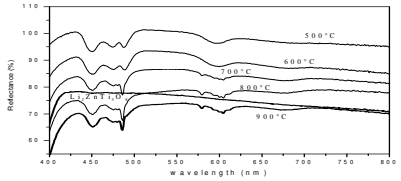

Figure 2

[1] M. S. C. Câmara,; M. F. C. Gurgel,; S. R . Lazaro,.; A . Beltran,.; E. R Leite,.; T. M . BOSCHI,.;, P. S . Pizani.; E . Longo, Room Temperatura Photoluminescênce Of The $Li_2znti_3o_8$ Spinel: Experimental And Theoretical Study. INTERNATIONAL Journal Of Quantum Chemistry, V. 3, P. 580-587,(2005).