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Synthesis and Characterization of Rutheno-Cuprates by Solid State Reactions

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A new class of hybrid rutheno-cuprates – such as the Ru-1212 and the Ru-1222 – was discovered in 1995 by Bauerfeind and collaborators. These materials present superconducting and magnetic states at low temperatures, an atypical duality in other superconductors. The superconductivity is more easily observed in the Ru-1222, while the Ru-1212 is a more problematic case, because of the strong effects of the preparation details in its superconducting properties, making the material be superconductor or not. The Ru-1212 presents a critical temperature that can vary between 0 and 46 K, depending on the preparation conditions, and a temperature of magnetic transition of around 132 K. The samples were prepared by solid state reactions, by using a mixture of high purity powders, followed by calcination and sinterization in the nitrogen and oxygen atmospheres. This paper shows the preparation process of the Ru-1212 samples, followed by their structural and magnetic characterization. (Financial Support: CNPq and FAPESP).

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Microstructural evolution of fast firing soft porcelain

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The present work deals with the study of the microstructural evolution of fast firing soft porcelains. Soft porcelains are those sintered at low temperatures (below 1350°C), and the thermal treatment used was similar to that of industrial products, with 10 minutes of sintering time. As raw materials kaolin, sodium feldspar, potash feldspar and talc, all except the former used as melting oxides in order to form eutectics at low temperatures. The compositions were formulated according the mixture design technique, four factors at three levels, with coordinate transformation by independent variables. The minerals were characterized to determine its chemical and mineral compositions and particle size distribution. Nine compositions were formulated, and the analyses were carried out for the thermal behavior (differential scanning calorimetry, DSC) and evolution of the crystalline phases with temperature (X ray diffraction, XRD). The results were interpreted by analysis of variance (ANOVA) and presented as response surfaces. There was glass formation due the effect of both feldspars (orthoclase and albite). Talc has influenced the porcelain densification. The main crystalline phases obtained were cordierite and cristobalite, due the presence of talc, and mullite and quartz, due the initial content of kaolin. Keywords: soft porcelains; microstructural evolution; fast firing; mixture design

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Sintering of Y_2O_3 -stabilized ZrO_2 powders obtained by different chemical methods

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The chemical methods allow obtaining powders with high reactivity and chemical homogeneity. This work studied the sintering of Y_2O_3 -stabilized ZrO_2 powders produced by polymerization routes. In the three methods used were obtained powders via formation of gels, which were characterized by spectroscopy in the infrared. After the gel calcinations, the powders obtained