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# $Ba_3(Ca_{1.18}Nb_{1.82})O_{9-\delta}$ Nanopowder Made with Sol-gel Autoigniting Synthesis and Its Electrical Conducting Property

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**ABSTRACT**

$Ba_3Ca_{1.18}Nb_{1.82}O_{9-\delta}$(BCN18) powder was synthesized using a wet chemical method from mixtures of all water-soluble compounds including Ba, Ca and Nb-citrate. It has been found that the ratio of citric acid and $NH_4NO_3$ in the initial solutions plays an important role in controlling the enthalpy of autoignition process as well as the gel decomposition temperature. Further steps include evaporating, drying, and calcinating. The obtained gels were characterized by thermogravity differential scanning calorimetry (TG-DSC), and the powder was characterized with X-ray diffraction (XRD), transmission electron microscopy (TEM), and biological engineering technology (BET). The experimental results have indicated that the heating temperature was only 600℃ for synthesizing the powder, and the average particle size was only about 40-50nm. Furthermore, it was found that a pure BCN18 phase with a complex perovskite structure formed at 900℃, which was about 700℃ lower than that of the traditional solid-reaction process. The solid oxide electrolyte was prepared using this powder, and its sintering behavior was studied. SEM was performed to observe the morphology of the sintered specimens. Its electrical conductivity was preliminarily investigated at intermediate temperatures (400 ~ 800℃). The results show that the sol-gel autoignition synthesis (SAS) process is superior to the wet-chemical process in alcohol salt system reported in literatures.