

Characteristic of Yttria Stabilized Zirconia Powder by Aerosol Flame Deposition

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The micro fuel cell is a candidate for mobile energy source such as portable electronic devices and self-sustaining electro-mechanical system. The numerous techniques have been suggested for the fabrication of thin film electrolyte of Solid Oxide Fuel Cell (SOFC).

Among techniques, a variety of spray pyrolysis techniques has been developed to produce yttria stabilized zirconia (YSZ) directly from solution. In this work, the aerosol flame pyrolysis deposition technique was used to prepare solid thin film of yttria-stabilized zirconia from the liquid source materials. The spherical and dense yttria stabilized zirconia particles were synthesized in the submicron range and the particle size distribution was dependent on the concentration of the precursor solution and flame conditions.

It was demonstrated that the aerosol flame pyrolysis deposition technique is a promising approach to realize inexpensive continuous process technology fabricating micro solid oxide fuel cell devices since this technique is capable of high deposition rate and employs simple and inexpensive equipment operating under ambient conditions.

The spherical and dense solid YSZ particles were synthesized and the XRD results revealed that the crystallinity of these particles were already excellent without additional heat treatment. Mean diameter of particles were approximately 400~600 nm and the particles were polycrystalline composed of approximately 20 nm sized grains.

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