Parametric Study of the CVD of YSZ From Organometallic Precursors

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Yttria-stabilized zirconia (YSZ) coatings are of interest as thermal barriers and ionic conductors. Commercial application of high quality, chemical vapor deposition (CVD) coatings will require methods to rapidly deposit relatively thick layers. It is the object of the current work to develop CVD techniques for rapid deposition, including the use of stagnation flow, reduced pressure, and metal-organic precursors.

Stagnation flow reactors have found increasing application in the electronics CVD industry. Under the proper conditions this configuration offers several advantages including uniform deposition rate over a wide area and short residence time at high temperature for the reactant species. Both of these characteristics are desirable for large-scale manufacture of YSZ films and coatings for thermal barrier, fuel cell, battery and sensor applications.

A parametric study of the deposition of YSZ has been completed that investigated the effect of flow rate, total pressure, concentration, and temperature on the nature and rate of deposition. The coatings were characterized with regard to growth rate, composition, and microstructure.

The results of the current study are being used to improve understanding of the kinetic of deposition in this system. In addition, it was observed that under specific conditions nano-scale microstructural features were deposited. These are being further characterized and the relative conditions for deposition defined.

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