

Fabrication of Nano-Structured Ceramic Coatings by Aerosol Deposition

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Aerosol deposition which is really a kind of powder spray coating technique is an emerging method for making highly dense ceramic coatings on metals, ceramics or even some plastics. It is carried out at room temperature in vacuum and is totally different from thermal spray or cold spray. Highly dense ceramic coatings were fabricated by the method. The coating process is characterized by a fast deposition, up to 100 micrometers per minute. The coating layer consisted of nano-crystallites and amorphous phase. Post-deposition heat treatment caused grain growth to various sizes depending on the coating material and the temperature.

The coating process was employed to fabricate several different kinds of ceramic coatings including PZT, NKN (lead-free ferroelectric), HA (hydroxyapatite), TiO₂ (Anatase for photocatalyst and DSSC), LSM and LSCF (conductive oxide protective coating on ferritic stainless steel for SOFC), and others. Significantly enhanced performances of the parts with those coatings were expected. In this presentation, fabrication, microstructure and properties of the ceramic coatings are presented.