

Deposition and Characterization of Al₂O₃ Thin Film by Aerosol Deposition

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Aerosol deposition is one of the promising deposition process to obtain high quality ceramic coating in room temperature. In this process, raw ceramic particles are injected to the substrate in the vacuum using slit type narrow nozzle. The nozzle is scanned on the substrate to get uniform film thickness. The ceramic film is formed by the The impact of particle on the substrate and consolidation of the particle.

In this study, Al₂O₃ thin films were deposited by aerosol deposition method directly from commercial Al₂O₃ powders. He gas was used as the carrier gas and the flow rate was 1~10 L/min. Aerosol chamber was vibrated to get uniform gas aerosol and supply particles to the process chamber continuously. High deposition rate more than 1 μm/min could be achieved. Process parameters such as carrier gas consumption rate, nozzle-substrate distance and vibration speed of the aerosol chamber were optimized. From the XRD analysis, Al₂O₃ thin film had the same crystal structure to starting powder but with high compressive stress. Al₂O₃ thin film also showed dense and crack-free microstructure. The filtering condition had large effects on the microstructure and crystal structure of the deposited film. Electrical properties of the thin film was also investigated.