

Abstract Submitted  
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**Modeling the Transport Phenomena in the Solution Precursor Plasma Spraying**<sup>1</sup> YANGUANG SHAN, University of Shanghai for Science and Technology — Solution precursor plasma spraying has been used to produce finely structured ceramic coatings with nano- and sub-micrometric features. This process involves the injection of a solution spray of ceramic salts into a DC plasma jet under atmospheric condition. During the process, the solvent vaporizes as the droplet travel downstream. Solid particles are finally formed due to the precipitation of the solute, and the particle are heated up and accelerated to the substrate to generate the coating. This work describes a 3D model to simulate the transport phenomena and the trajectory and heating of the solution spray in the process. The jet-spray two-way interactions are considered. A simplified model is employed to simulate the evolution process and the formation of the solid particle from the solution droplet in the plasma jet. O'Rourke's droplet collision model is used to take into account of the influence of droplet collision. The influence of droplet breakup is also considered by implementing TAB droplet breakup models into the plasma jet model. The temperature and velocity fields of the jet are obtained and validated. The particle size, velocity, temperature and position distribution on the substrate are predicted.

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Yanguang Shan  
University of Shanghai for Science and Technology

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