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## Development of hydroxyapatite coatings by solution precursor plasma spray process and their microstructural characterization

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### Abstract

Solution precursor plasma spraying (SPPS) is a promising method of obtaining coatings with unique microstructural features. The present study reports about the development of hydroxyapatite (HA) coatings by SPPS using water-based calcium-phosphate solution and about the analyses of their microstructure. X-ray diffraction (XRD) analysis showed that HA was the major crystal phase of the coatings, being present in the range from 95% to 98%. The coatings of greater HA content were obtained while spraying using shorter spray distance. The coatings crystallinity ranges from 24% to 69% depending on the temperature at deposition. An increase of the temperature results in greater crystallinity. The obtained coatings' microstructures may be described by *dome-like* surface and by the columnar-like cross-section when using precursor with low concentration. The use of concentrated solution precursor results in *cauliflower-like* structures composed of agglomerated fragmented shells and fine spherical particles. The possible phenomena occurring in droplets in contact with the plasma jet and the coating build-up mechanisms were tentatively explained.

**Keywords:** *Hydroxyapatite coatings, solution precursor plasma spraying, crystallinity, percent purity, coating microstructures*

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