## Aluminum phosphate sealed alumina coating: characterization of microstructure

The microstructure of aluminum phosphate sealed plasma-sprayed alumina coating was characterized by X-ray diffractometry, scanning electron microscopy, and analytical transmission electron microscopy. Microstructural characterization was carried out to identify the phases of the coating and to understand better the strengthening effect of aluminum phosphate sealant in the coating. The main phases in the coating are metastable $\gamma$-$Al_2O_3$ and stable $\alpha$-$Al_2O_3$. The overall structure of the coating is lamellar with columnar $\gamma$-$Al_2O_3$ grains. The aluminum phosphate sealant shows good penetration into the coating to the depth of about 300 μm filling the structural defects such as pores, cracks and gaps between the lamellae. The sealant in the coating has the relative composition of 26 at.% aluminum and 74 at.% phosphorus giving the molar ratio P:Al of 3, which refers to the metaphosphates $Al(PO_3)_3$. There is also some crystalline aluminum phosphate in the coating, in the form of berlinite-type orthophosphate $AlPO_4$, owing to the reaction between the sealant and the alumina coating. Thus, the phosphate bonding in the alumina coating is based both on chemical bonding resulting from the chemical reaction with the alumina coating and on adhesive binding resulting from the formation of the condensed phosphates in the structural defects of the coating.

## Dow Corning introduced a new plasma processing technology, Aremco Products introduce Ceramacoat 503-VFG-C for thermal spray functional coating industry Mark Drukenbrod– Mar 24, 2005

Dow Corning Plasma Solutions recently introduced a new plasma processing technology that allows functional, high molecular weight nano-coatings to be deposited on various materials by room temperature plasma without the need for vacuum equipment.

The new process sprays atomized droplets of liquid precursor directly into the room-temperature plasma at atmospheric pressure. Other plasma processing systems rely on gas state precursors or applying liquid to the substrate before plasma activation. Allowing the use of liquid precursors means the new process can provide a larger range of chemistries and properties than other surface engineering techniques. The plasma does not damage the liquid precursor molecules so all the properties, functionality and value of the original precursor are delivered in the form of a polymerized, cross-linked and well-adhered nano-coating.

A new product introduction for the thermal spray functional coating industry seeks to solve a major problem there: micro porosity. Ceramacoat 503-VFG-C from Aremco Products in Valley Cottage, NY, is a high temperature, ceramic-based sealant used to fill the micro porosity in various thermal spray coatings. This coating is formulated as a single part, water-dispersible, alumina-filled system. It is applied using a sponge brush or pneumatic spray equipment, and then cured 1-2 hours at 700 degrees F., at which point it sinters onto the underlying thermal coating, sealing it. Thank you for reading and using PaintandCoatings.com, powered by SpecialChem. **Mark Drukenbrod** editor@paintandcoatings.com