Rheology of alumina/binders mixture for low-pressure injection molding

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Low-pressure injection molding has important advantages over other methods for the production of advanced ceramic parts with complex shapes. In this work, a paraffin-based binder system was studied for low-pressure injection molding of very fine average particle size alumina powder (0.4 μm). The rheology of powder/binder was tested for two surfactants (dispersants): oleic and stearic acids. The effect of carnauba wax content also was studied. Carnauba wax is a brittle, hard vegetable wax and its chemical composition has high percentage of alquil esters of fatty acids, caboxylic acids and other components. The addition of the correct amount of an effective dispersant is very important to enhancing the dispersion of the powder in the melted binders, and increase solids loading while maintaining good viscosity. The agglomeration of the powder is minimized with the adsorption of dispersant in the particle surface. The carboxylic acids appear to be most suitable dispersants for ceramic oxide powders.

Keywords: low-pressure injection molding, alumina, binders, rheology.

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