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Characterization of fabricated feedstock using nano powders and a water-soluble binder in micro metal injection molding

Abstract

Micro metal injection molding has become the promising method in powder metallurgy research in order to fabricate small-scale intricate parts in an influential process and competitive cost of mass production. Stainless steel 316 L powders with powder size of 150 nm and 5 μm were mixed with a binder with a water soluble component which consisted of a major fraction of water soluble Polyethylene Glycol (PEG), a minor fraction of polymethyl-methacrylate (PMMA) and some stearic acid has been used as a surfactant. This work aims to investigate the rheological properties of a feedstock which are efficiently characterised by capillary Rheometry to measure apparent viscosities at different temperatures and shear rates. Results obtained by the varying feedstock characteristics, when viscosity decreases by increasing of shear rate at certain temperature feedstock should have a pseudoplastic behaviour. Melt viscosity of the feedstock was decreased by adding Nano-scale powders. The reduced (n) values at high temperature with addition of nanoparticles indicated a possible increase in the shear-thinning behavior.

Keywords

Micro metal injection molding; Nano powder; Viscosity; Water-soluble binder