

Accepted Manuscript

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PII: S0925-8388(18)32536-2

DOI: [10.1016/j.jallcom.2018.07.036](https://doi.org/10.1016/j.jallcom.2018.07.036)

Reference: JALCOM 46751

To appear in: *Journal of Alloys and Compounds*

Received Date: 20 April 2018

Revised Date: 30 May 2018

Accepted Date: 3 July 2018

Please cite this article as: J. Wei, J. Li, X. Song, Y. Feng, T. Qiu, Effects of solid loading on the rheological behaviors and mechanical properties of injection-molded alumina ceramics, *Journal of Alloys and Compounds* (2018), doi: [10.1016/j.jallcom.2018.07.036](https://doi.org/10.1016/j.jallcom.2018.07.036).

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**Effects of Solid Loading on the Rheological Behaviors and Mechanical
Properties of Injection-Molded Alumina Ceramics**

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Abstract

In this work, alumina ceramics were prepared by injection molding. The effects of solid loading on the rheological behaviors of the feedstocks, as well as the resulting properties of the green bodies and sintered ceramics were investigated. It was found that the viscosity and stabilized torque values of the feedstocks increased with the increase of solids loading in the range of 48-54 vol.%. The feedstock with 54 vol.% alumina exhibited dilatant rheology behavior and high viscosity; however, the feedstocks with less than 52 vol.% alumina exhibited pseudoplastic rheology behavior. After removing the organic binder, the pre-sintered bodies with high alumina content had smaller most frequent pore diameter, which was beneficial to sintering densification. With an increase in solid loading, the density of the green and sintered bodies increased and the shrinkage decreased. The green and sintered bodies at the solid loading of 52 vol.% presented uniform, compact microstructures, and possessed the highest bending strength of 25 MPa and 440 MPa, respectively.

Keywords: Injection molding; solid loading; rheological behavior; mechanical properties; alumina

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