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Sintering behavior of ionic and electric conductor ceramics is enhanced when an external electric field is applied during the sintering process by Joule heating, generation of Frenkel defects, mobility of point defects, electrochemical reactions and electromigration mechanisms. The applied electric field modifies the sintering behavior in two ways, depending mainly on the strength of the field (V/cm) and the electrical properties of the sample. Intermediate fields enhance the sintering kinetics apparently due to the retardation of grain growth, which is called field assisted sintering. In contrast, high fields generate massive densification just in few seconds, which is recently referenced as flash sintering. Nonetheless, the majority of these studies are performed for solid state sintering (SS), whereas only a few works have been published on liquid phase sintering (LPS).

In this work, the effect of the electric field on liquid phase sintering is analyzed in detail, being the first time that flash sintering is observed in LPS. Alumina containing different amount of a glassy phase (Al_2O_3/CAS) was chosen to ascertain the role of current on liquid phase sintering using a sinter-forging device. *In situ* laser dilatometry, evaluation of specimen temperature, real-time measurement of electrical field and current density are complemented by microstructure analysis and sintering rates calculations, which give insights of involved mechanisms as function of the sintering conditions and applied field. In addition, viscosity measurements and wettability studies of the glass at high temperature were carried out to reveal the effect of current on the response of glass. Current flowed only through the liquid phase at high temperature and enhanced the densification process by two effects: Joule heating and athermal response of the viscous liquid under the electric field. Joule heating increased the temperature within the specimen, whereas the applied electric field reduced the viscosity of the liquid phase promoting a more effective matter transport.