

Understanding the mechanism of Flash Sintering with in situ EDXRD experiments

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Flash sintering is the latest addition to the field of sintering in which electric field is applied at sufficiently high temperature (which depends on material property), which leads to rise in conductivity and the current in response rises non-linearly. A current tab is put to limit this current to avoid the thermal runaway and eventually melting of ceramics. With the appropriate setting of this current, a very high rate of sintering can be achieved with and near full density. This rise in conductivity has been explained by localized joule heating or colossal defect nucleation in bulk. With the in-situ Energy Dispersive X ray diffraction technique (EDXRD) we analyze the relation of this excited state and enhanced diffusion with lattice expansion and try to separate the contribution of electric field generated defects and electrical joule heating because of resistance of sample through cyclic flash experiments on YSZ.