Sintering and grain growth kinetics in La$_{0.85}$Sr$_{0.15}$MnO$_3$–Ce$_{0.9}$Gd$_{0.1}$O$_{1.95}$ (LSM–CGO) porous composite - DTU Orbit (28/07/2019)

Sintering and grain growth kinetics in La$_{0.85}$Sr$_{0.15}$MnO$_3$–Ce$_{0.9}$Gd$_{0.1}$O$_{1.95}$ (LSM–CGO) porous composite was studied by applying a two-stage master sintering curve (MSC) approach and comparing with LSM and CGO single-phase materials. In the two-stage MSC, sintering mechanisms occurring at different stages were separated with respect of density, giving a typical apparent activation energy values for each sintering stage of the LSM–CGO system. Compared with the single-phase materials, retardant effect of the different phases on mass diffusion leads to much higher apparent activation energy for densification of the composite. Similarly, constrain effect was also observed in grain growth in the composite. Particularly, in the investigated temperature range (1100–1250°C), the determined grain boundary mobility of CGO in the LSM–CGO composite ($10^{-16} - 10^{-16}$ m$^2$N$^{-1}$s$^{-1}$) is comparable with the single-phase CGO, while the grain boundary mobility of LSM in the composite ($10^{-17} - 10^{-16}$ m$^2$N$^{-1}$s$^{-1}$) is around 1 order of magnitude smaller than the single-phase LSM.

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