Densification and grain growth kinetics of Ce0.9Gd0.1O1.95 in tape cast layers: The influence of porosity

The sintering behavior of Ce0.9Gd0.1O1.95 (CGO) tape cast layers with different porosity was investigated by an extensive characterization of densification, microstructural evolution, and applying the constitutive laws of sintering. The densification of CGO tapes associates with grain coarsening process at the initial sintering stage at T < 1150°C, which is mainly influenced by small pores and intrinsic characteristics of the starting powders. At the intermediate sintering stage, densification is remarkably influenced by large porosity. Moreover, the sintering constitutive laws indicate that increasing the initial porosity from 0.38 to 0.60, the densification at the late stage is thermally activated with typical activation energy values increasing from 367 to 578 kJ mol−1. Similar effect of the porosity is observed for the thermally activated phenomena leading to grain growth in the CGO tapes. The analysis of sintering mechanisms reveals that the grain growth behavior at different porosity can be described using an identical master curve. © 2014 Elsevier Ltd. All rights reserved.

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