Modeling sintering of multilayers under influence of gravity

There is a tendency for multiple functional ceramic layers used in various applications to have increasing surface areas and decreasing thicknesses. Sintering samples with such geometry is challenging, as differential shrinkage of the layers causes undesired distortions. In this work, a model, which describes the combined effect of sintering and gravity of thin multilayers, is derived and later compared with experimental results. It allows for consideration of both uniaxial and biaxial stress states. The model is based on the Skorohod-Olevsky viscous sintering framework, the classical laminate theory and the elastic-viscoelastic correspondence principle. The modeling approach is then applied to illustrate the effect of gravity during sintering of thin layers of cerium gadolinium oxide (CGO), and it is found to be significant. © 2012 The American Ceramic Society.

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