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Ceramic powders are often produced by sol-gel method or by pyrolysis of some form of precursors. This presentation will emphasize the consolidation of such powders using the Electrical Field Assisted Sintering (EFAS) method. The role played by the external electrical field and/or the heating rate will be specifically investigated. This observation will be supported by in-situ sintering studies inside a TEM in the presence of a biased electrical voltage.

One can take advantage of the EFAS process to produce functionally graded material by using asymmetric die design. Similarly, one can consolidate, as well as form to shape, ceramic components in-situ in the EFAS chamber by designing the die appropriately. Since EFAS is a fast process, grain growth can be minimized during consolidation, leading to excellent optical transmission properties in nanoceramics. Superplasticity in ceramics can be achieved at significantly lower temperatures. This investigation was supported in part by ONR grant with Lawrence Kabacoff as the Program Manager.