

PERMEABILITY ANALYSIS FOR THERMAL BINDER REMOVAL FROM GREEN CERAMIC BODIES

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ABSTRACT

The permeability of unlaminated and laminated green tapes was determined as a function of binder content for binder removed by air oxidation. The tapes are comprised of barium titanate as the dielectric, and polyvinyl butyral and dioctyl phthanlate are the main components of the binder mixture. The flow in porous media through the tapes was analyzed in terms of models for describing Knudsen, slip, and Poiseuille flow mechanisms. The characteristic pore size was determined to be 0.5-2 μm , and thus Poiseuille flow was the dominant transport mechanism contributing to the flux. The permeability was then determined from Darcy's law for flow in porous media. The permeability was also determined from micro-structural attributes in terms of the specific surface, the pore fraction, and a term to account for tortuosity and constrictions. The permeability and adhesion strength of laminated green ceramic tapes were determined as a function of lamination conditions of time, temperature, and pressure.