**Modelling the Flow Field of the Binder Burnout Process with Chemical Reactions**

Binder burnout is one of process happened in the fabrication of multilayer ceramic capacitors (MLCCs). The binder burnout is a process that takes a long time and plays an important role in the defect formation of the ceramic body during the ceramic manufacturing process (1). From the perspective of environmental load reduction, it was stated that industries that involve ceramic industry produce about 40% of the greenhouse gas generated by energy consumption (2). Moreover, the energy efficiency is low. Several parameters involving heated temperature also have been mentioned to affect the dielectric properties of MLCCs (3, 4). Therefore, optimizing the heating strategy is necessary to obtain better quality and a higher yield of the product.

Superheated steam has been recognized as one method in heating and drying the ceramic materials (5). It gives good efficiency in usage of energy and time. Therefore, study about conducting binder burnout process with superheated steam is needed to be done. Currently, NORITAKE company is collaborating with Yageo-KEMET in installing the superheated steam for the MLCC fabrication. The unique gas flow produced from the superheated steam is necessary to be studied as flow maldistribution is generally caused by poor design and imprecise fabrication of the distributor (6). Therefore, we propose to analyze the efficacy of superheated steam in terms of several parameters such as flow patterns and temperature distributions, which can be done using computational fluid dynamics (CFD) (7). The CFD analysis will be done using commercial CFD software CRADLE.

Additionally, the gas flow behavior of the superheated steam might affect the dielectric properties of fabricated MLCCs. The residual pore might appear after binder burnout. A pore structure created by the burnout process and a relationship between the pore structure and the burnout process are to be important for the reliability and dielectric property of MLCCs (8). Therefore, we propose to investigate the properties changes in fabricated MLCCs by adding assumptions that the MLCCs are considered as porous medium. By utilizing porothermoelastic model, equilibrium equation of stress tensor and strain tensor can be generated.

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