Characterization of BaSnO$_3$-based ceramics: part 1. synthesis, processing and microstructural development

ABSTRACT

The compound BaSnO$_3$ together with its Ca- and Sr-analogs, has recently been projected as potential electronic ceramic material (thermally stable capacitor, chemical sensor for humidity, CO and NOx, etc.). In order to fill the information gaps in the reported research, a vigorous and systematic investigation on these exotic materials has been initiated. A thorough study of BaSnO$_3$ with respect to its synthesis, processing and microstructural characterization has been made. In order to establish a standard methodology for low-cost mass-manufacturing with identical and beneficial microstructure and reproducible electrical characteristics, different synthesis routes (solid-state and self-heat-sustained) were adopted. Evolution of microstructure which is intimately related to the envisaged properties in the ceramics, was closely and systematically followed in terms of sintering over a wide range of temperatures and soak time. This communication forms the first of two parts in a series of investigations on MSnO$_3$ systems, where results on the synthesis and processing of phase pure barium stannate (BaSnO$_3$) and development of interesting microstructure are presented.

Keyword: Barium stannate; Capacitor; Gas sensor; Electronic ceramics; Solid-state; Self-heat-sustained; Microstructure