
Multiscale phase analytical investigation of a CMAS batch

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Abstract

To model the melting behavior of different batches, data that have been experimentally validated are strongly required.

This study aims to precisely identify and analyze the phase progression during the melting process of a CMAS batch and validate the progression or point out possible differences using experiments of different scales.

Thermodynamic data has been used to calculate the phases formed as a basis for all the data subsequently determined experimentally.

The range of scales covered in the laboratory includes measurements from the micro to the meso to the macro scale. The main focus of the analytics are the investigations using high-temperature XRD (HT-XRD). By using HT-XRD, it has been possible to determine the phase transition in-situ from room temperature up to 1200 °C. The phases were compared with the ex-situ HT-XRD measurements of macroscale experiments to be able to gain cross-scale conclusions. Based on all the data obtained, a model will be developed that can describe the phase composition during the entire melting process, and that can be used as a basis for adding further experimental parameters to provide an all-encompassing view of the melting process of the CMAS batch.

Keywords: Batch melting, XRD, Phase transformation, CMAS

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