

31ST MATERIALS SCIENCE AND ENGINEERING CONFERENCE: ADVANCEMENT & INNOVATIONS

October 15-17, 2018 Helsinki, Finland

Microstructural development in nanoferrites

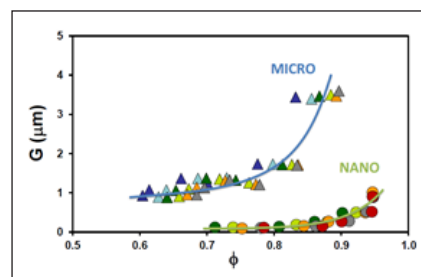
Antonio Barba, Carolina Juan Carlos Jarque, Juan#Clausell-Terol Fonfría

Chemical Engineering Department. Jaume I University of Castellón, SPAIN

Luis Nuño-Fernández, Communications Department, Polytechnic University of Valencia, SPAIN

Chemical Engineering Department. Jaume I University of Castellón, SPAIN

Physical properties of advanced ceramics, as soft ferrites, are strongly dependent on its microstructure. Usually, final microstructure for advanced sintered materials requires high relative density (porosity close to zero), small average grain size and narrow grain size distribution in order to get good final physical properties. This paper shows the relationships between these microstructural variables (relative density and average grain size) and process parameters (compaction process parameter, as for instance pressing pressure, and thermal cycle, including sintering temperature and dwell time), using a nanoparticulated ferrite as raw material. NANO powder has been obtained by high-energy milling of ferrite industrial pellets. Sintered microstructure has been observed by Scanning Electron Microscopy (SEM), obtaining the average grain size by image analysis of the SEM micrographs. Relative density was determined by the Archimedes method, using true density material value. The relationships that have been founded between both microstructural variables (average grain size and relative density) have a similar mathematical form than the ones shown in literature when a microparticulated ferrite powder is used. The main conclusion is that NANO particulated ferrites allowed to obtain sintered bodies with a higher relative density and lower grain growth than the ones obtained from MICRO particulated ferrites, which may have a straight influence on final physical properties, probably enhancing them, as has been observed in sintered bodies from MICRO powders.



Acknowledgements

The study has been partially funded by the Spanish National Plan for Scientific Research, Development, and Technology Innovation of the Spanish Minister of Economy and Competitiveness (project MAT2016-76320-R) and the Jaume I University of Spain (project UJI-B2017-48).

Biography

Antonio Barba has done PhD in Chemistry and Full Professor of Chemical Engineering at the Jaume I University of Castellón (UJI). His research is focused on the application of the chemical engineering principles to the ceramic materials production processes, which is developed in the Chemical Engineering Department since 1986. He has collaborated in more than 90 research projects, funded both by public agencies and by private companies. The results of research are published in 6 books and more than 100 scientific papers.

barba@uji.es