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Glass-ceramic composites from the extrinsic to the intrinsic point of view

Composite material is a production field that reached, already in the last century, its full development in science, technology and market applications. At the starting of composites materials research, usually only those materials that are composed by a dispersed material into a continuous matrix were considered as “actual composites”. However, this concept has evolved more in recent decades due to the capability to precipitate into a matrix for internal thermal processing or phase transformations of several heterogeneous shaped materials into several matrices and/or respectively; that is the case of the glasses and glass-ceramic composites. Thus, inside the “non-metal or inorganic composites”, both glasses and glass-ceramics which have given rise to the fine or advanced ceramics, the “glass-ceramic composites” can be considered as composites. To this respect, there are two ways for considering composites in this research: a) The extrinsic, more traditional composites, by embedding a phase into another phase or b) to promote the phase transformation into a glassy or vitreous phase for precipitating very small crystallites (even nanocrystals) into the glass, giving rise to an “intrinsic glass-ceramic composite”. Some of researches carried out in last decades of the author in this type of composites are reviewed and possibilities for applications for this material are discussed. In fact, this wide family of composites can be very useful for construction or for industrial applications. Even more, in recent years, the “composite concept” for materials and for processes is emerging as one promising solution for using this technology to immobilize some radioactive wastes into composite glass-ceramic matrices with long term stability.

Biography

Jesús Ma Rincon is a Senior Research Professor (Profesor de Investigación) at the Instituto E Torroja de Ciencias de la Construcción, CSIC, Madrid, where he is the Founder and Head of the Glass-Ceramics Laboratory. He was General Secretary of the Spanish Glass and Ceramic Society and Editor-in-Chief of *Bol. Soc. Esp. Ceram. Vidrio*. He has conducted electron microscopy on ceramics, glasses and glass-ceramics and their raw materials, being author of seven monograph books and more than 170 papers in glass-ceramics and advanced ceramics. He was invited Professor at the Department of Materials Science and National Electron Microscopy Lab, University California, Berkeley, during 1984-85 working in zirconial/mullite composites. Since last 15 years, he is active in the vitrification and recycling of a wide range of residues, up to simulated radioactive industrial wastes. Recently, he was the past President of the Spanish Society of Scientists.

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