Flash Sintering of Ceramics

Prof. **Rishi Raj**
Universidad de Colorado en Boulder

Abstract:

Flash sintering is a novel densification technology for ceramics, which allows a dramatic reduction of processing time and temperature. It represents a promising sintering route to reduce economic, energetic and environmental costs associated to firing. Moreover, it allows to develop peculiar and out-of-equilibrium microstructures.

The flash process is complex and unusual, including different simultaneous physical and chemical phenomena and their understanding, explanation and implementation require an interdisciplinary approach from physics, to chemistry and engineering. In spite of the intensive work of several researchers, there is still a wide debate as for the predominant mechanisms responsible for flash sintering process.

This talk will include an overview of the original research that led to the discovery of the technique by Prof. Raj, as well as an analysis of the most significant mechanisms proposed for explaining the “flash” event. It will also include future scientific activities and potential technological implementations.

Biografía:

Prof. Rishi Raj pursued his Ph.D. in 1965 at Harvard. He graduated in 1970 with a Ph. D. in Engineering and Applied Sciences, under the tutelage of Mike Ashby and David Turnbull. After graduating he worked from 1971-1972 as a Staff Scientist at Chase Brass and Copper Company in Cleveland, OH. He returned to Academia in 1972 when he became an Assistant Professor of Mechanical Engineering, University of Colorado at Boulder, CO (1972-1975). In 1975, Raj accepted a position as Professor of Materials Science and Engineering at Cornell University, Ithaca, NY. He worked at Cornell for 21 years from 1975-1996. In 1996, he moved back to Boulder and is currently employed as Professor of Mechanical Engineering, University of Colorado at Boulder, CO.

Prof. Raj has studied oxides and non-oxides to understand a wide range of behavior phenomena, including high-temperature creep, superplasticity, interfaces and amorphous phases and their role in sintering and creep, sintering mechanisms, and polymer-derived amorphous materials. Most recently, he has turned his attention to understanding electric field effects on sintering and defect chemistry, also called “flash sintering.”

Through his career, he has published more than 450 peer reviewed articles in refereed International Journals, with over 20,000 citations of his work on Google Scholar.
He has been named a 2015 Distinguished Life Member by The American Ceramic Society, the highest honor accorded to members of the scientific and technical organization—recognizes an individual’s eminent contribution to the ceramic and glass profession.