

## **PROCESSING AND ENGINEERING APPLICATIONS OF STRUCTURED CELLULAR CERAMICS THROUGH FREEZING ROUTE**

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We will report processing and engineering applications of cellular ceramics through freezing route, discussing in terms of: (1) the processing factors to create very high porosity up to 98vol% and the relationship between raw materials and slurry preparation; (2) the effect of freezing temperature and ice-binding additives on microstructures created; (3) the engineering applications of the cellular monoliths by using various starting materials, very low thermal conductivity, good electrochemical responses, dielectric and piezoelectric properties and improved strengths. In addition to that, the image based modelling techniques for mechanical properties and thermal conductivities of the resultant monoliths, based on actual microstructures collected by X-ray computed tomography, will be also studied, discussing those properties and cellular morphologies created by various freezing conditions. The simple, ecofriendly and versatile approach can modulate unique cellular architectures.