Acoustic performances of metal powder-based materials

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ORAL PRESENTATION

ABSTRACT

Materials employed as electrodes on Molten Carbonate Fuel Cells (MCFC) are soft ribbon like plates constituted by a porous metal mixture. Metals employed are nickel for the cathodic electrode and nickel and chrome for the anodic one.

Plates are realized from the metal powders which are treated by tape casting and sintering processes. In the tape casting process the metal powders are held together by an organic binder (slurry); the metal slurry is spread continuously over a conveyor belt with the help of a doctor blade to form a flat, even layer. This layer of slurry is subsequently dried for further processing (sintering).

Material characteristics as well porosity and density may be properly designed by varying powder particle size, organic binder composition and sintering conditions. Such a material may be potentially valuable as acoustic absorber and their acoustical properties maybe tuned by changing the porosity fitting the peculiar application. Generally material for MCFC requires very low impurity and air bubbles content which make their cost a critical issue; in acoustical application such a requirement it is thought not to be important; refuse samples, which constitute the majority, may be used contributing strongly to cut costs.

This paper deals with an investigation on a typical MCFC material to verify their suitability for noise insulation and absorption. For this purpose, a measurement campaign by Kundt tube on MCFC electrodes has been carried out by varying the plate porosity, width, mixture content and purity; optimal configuration has been found in terms of maximum absorption frequency. Results suggested that, for acoustical application, some metal powder maybe substituted by a polymer powder in order to further reduce costs and further improve absorption. Manufacturing procedures are actually under study.