11th International Conference on Advanced Materials
Rio de Janeiro Brazil
September 20 - 25
ICAM2009

Preparation of alumina ceramic foam with low environmental impact for application in oil industry

Luciara B. Barbosa [(1)*], R. S. Silva [(2)] ,Lilian M. de Jesus [(2)] Silvaneide de J. Matos [(2)] , Zélia S. Macedo [(2)]

(1) Núcleo de Física, Campus Prof. Alberto Carvalho, Universidade Federal de Sergipe, Av. Vereador Olimpio Grande, Centro, 49.500-00, Itabaiana – SE
(2) Departamento de Física, Campus Prof. José Aloísio de Campos, 49.100-000, São Cristóvão - SE
* luciara@if.sc.usp.br

Abstract – Ceramic foams are porous structures with high mechanical strength, used as filters and as supports for catalysts, with applications in various areas related to the chain of oil knowledge. In this work we report on a method of producing alumina ceramic foams that involves a stage of mechanical production of pores inside a clean proteic sol-gel route [1] to minimize environmental impact.

The porous structure of ceramic foams promotes the selective retention of impurities and is promising as a support for catalysts. The versatility of the ceramic foams is related to the use of innovative processing techniques and the variety of available materials, resulting in a material with a structure of high permeability, good mechanical strength and chemical and structural uniformity.

The most common technique for production of ceramic foam is the method of replication but, although this method is efficient and successful, it causes problems from an environmental standpoint, particularly if produced in large scale. Because of that, the search for alternative procedures for the production of ceramic foams is becoming important, necessary and beneficial for reducing environmental impact, both for use in oil as for many other applications.

In this research work we propose the development of a method of producing alumina ceramic foams involving a stage of production of mechanical pores as a way of minimizing the environmental impact in the production process. The research work aims, in addition to the use of a clean proteic sol-gel route, to investigate the dependence of the porosity, size and structure of pores formed in the ceramic foam, with the experimental conditions used in the alumina synthesis.

Table 1: Samples prepared with pre-calcined xerogel at 500 °C for 4 h and sintered at 1300 °C for 4 h.

% of glassy phase	10	20	30	40	50
ρ (g/cm^3) of composite (experimental)		1.43	1.50	1.50	1.50
ρ (g/cm^3) theor. compos. (from XRD)	*	2.13	2.27	2.25	2.06
ρ (%) relative	*	58	64	67	64
Porosity , *P* (%)	*	42	36	33	36

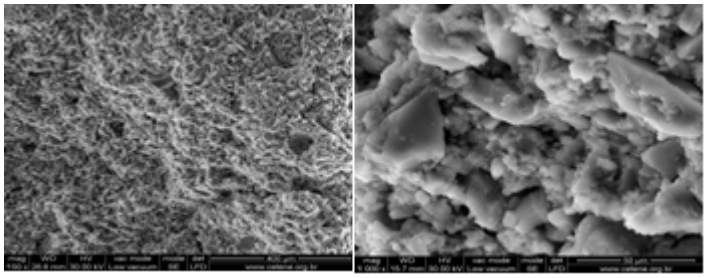

Figure 1: SEM micrographs of fractured ceramic foams with 20% of glassy phase.

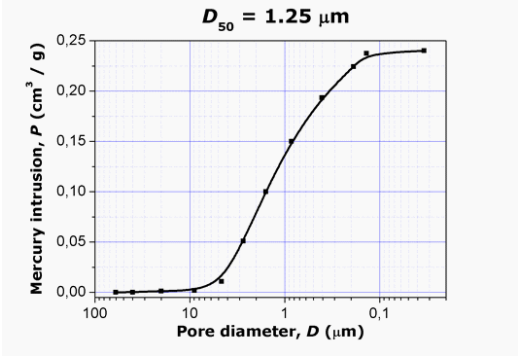

Figure 2: Mercury porosimetry of the sample of foam ceramics with 20% of glassy phase.

References

[1] M.A. Macedo e J.M. Sasaki, Processo de fabricação de pós nanoparticulados**, Patente**: Privilégio de Inovação n.PI 0203876-5, 24 de Setembro de 2002 (Depósito).