Nanocomposites and nanomaterials

Porous texture and crystallinity control of porous SiC

D. Korytko[1], S. Gryn[1], S. Alekseev[1], V. Zaitsev[1], S. Khaynakov[2], V. Iablokov[3], N. Kruse[3]

[1] *Taras Shevchenko National University of Kyiv, Volodymyrska str. , 62 Kyiv-01601, Ukraine. E-mail: alekseev@univ.kiev.ua*

[2] *University of Oviedo, Julián Clavería 8, 33006 Oviedo, Spain*

[3] *Université Libre de Bruxelles, Chemical departement, Campus de la Plaine, CPMCT - CP, 1050 Bruxelles, Belgium*

Thermal, mechanical and chemical stability together with high thermal conductivity make the mesoporous SiC with well-ordered crystalline pore walls highly demanded for catalytical and nanofiltration applications.

In the present work we describe the porous SiC with uniformly-sized mesopores, prepared by pyrolysis of the nanocomposites of polycarbosilane (PCS) polymer and SiO_2 nanoparticles (Ludox®) followed by the template leaching. The influence of the PCS:SiO_2 ratio, the template nanoparticle size (12 – 22 nm), pyrolysis temperature (1200 – 1400ºC), nanocomposite preparation route (PCS/SiO_2 NPs organic sol evaporation or SiO_2 NPs xerogel impregnation) and addition of Ni to the PCS:SiO_2 nanocomposites on the resulted SiC porous texture, crystallinity and oxidation stability was analyzed.

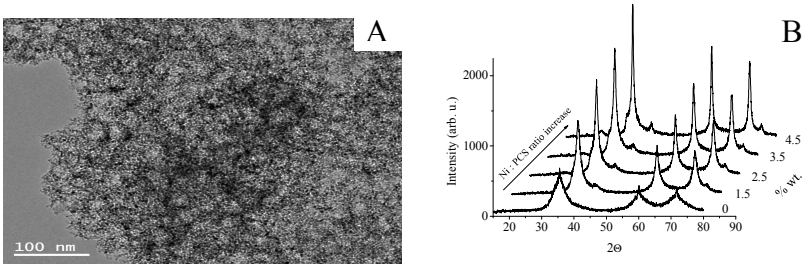

Fig. 1. A. TEM image of porous SiC made of 22 nm SiO_2 NPs template; B. Powder XRD patterns of porous SiC samples prepared at 1200ºC with different Ni loading.

The synthetic conditions allowing to get precise porous SiC replica of the SiO_2 NPs template were found (Fig. 1A), the effect of temperature increase and Ni addition on the crystallinity improve was demonstrated (Fig. 1B).

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