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Book of Abstracts

ORGANIZERS

COMBUSTION SYNTHESIS OF NEW CARBON-RELATED HETEROGENEOUS NANOSTRUCTURES

Huczko A.[1*], Lange H.[1], Bystrzejewski M.[1], Cudziło S.[2]

[1] Department of Chemistry, Warsaw University, 1 Pasteur str., 02-093 Warsaw, Poland

[2]Department of Chemistry, Military University of Technology, 2 Kaliski str., 00-908 Warsaw, Poland

*ahuczko@chem.uw.edu.pl

Combustion synthesis is known to be a source of i.a. novel carbon-related nanostructures like silicon carbide fibres [1], soot [2] and carbon encapsulates containing magnetic nanocrystallites [3]. We present here the results of combustion of different powdered compositions in a modified calorimetric bomb. This technique proved to be very efficient to produce silicon carbide nanowires from Teflon® (politetrafluoroetylene) and different reductant ($CaSi_2$, Si) mixtures – Fig.1. The effect of process variables (combustion atmosphere, stoichiometry of reactants, etc.) on synthesis yield has been investigated. The protocol to isolate and efficiently purify (above 90 wt%) the final product was proposed [1]. The resulting β-SiC nanofibres, several microns in length and ca. 20-100 nm in diameter, were characterized by using different techniques (XRD, Raman, SEM, TEM, elemental analysis).

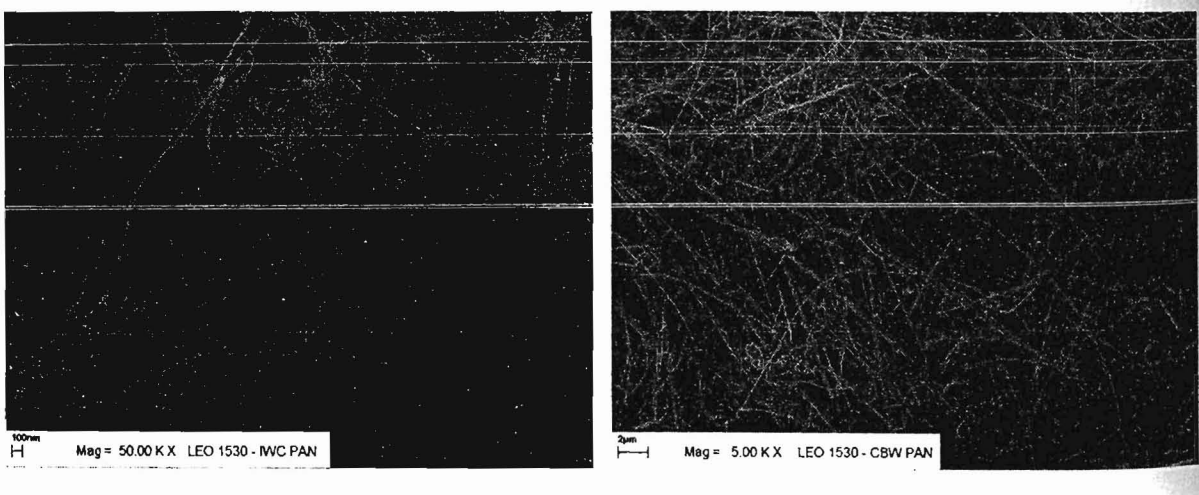

Fig. 1. SEM images of SiC nanofibres

The combustion in NaN_3-C_6Cl_6 and NaN_3-C_2Cl_6 systems yielded, after purification, a carbon material which proved to posess interesting physicochemical (selective sorption) and

electrochemical properties [2]. Carbon nanoencapsulates (ca. 20-60 nm in diameter) containing magnetic nanoparticles were also obtained via combustion synthesis from mixtures NaN_3-C_6Cl_6-ferrocene or NaN_3-C_6Cl_6-$Fe_{14}Nd_2B$ [3] – Fig. 2. The effect of combustion atmosphere (N_2-O_2 mixtures) on product compositions and its magnetic properties has been studied.

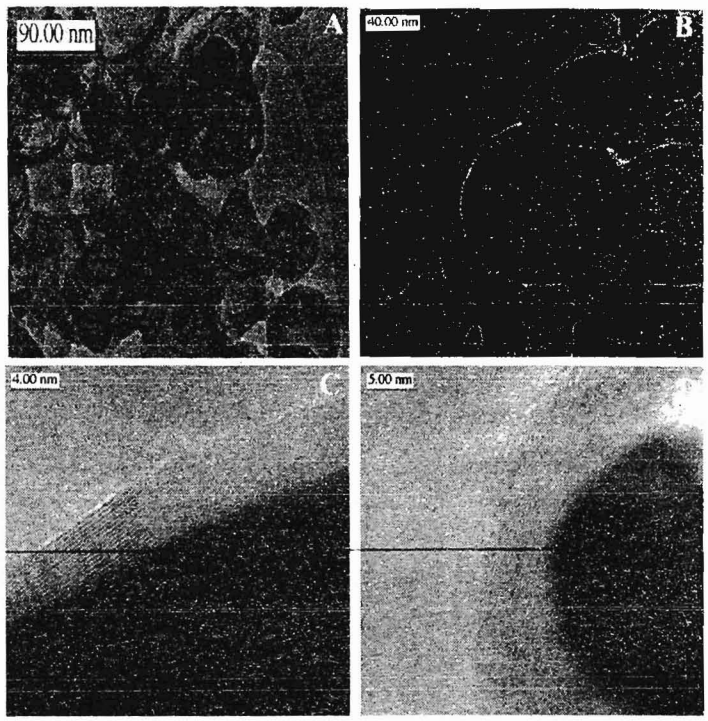

Fig. 2. TEM images of carbon encapsulates containing magnetic core

Those autothermal processes have inherent advantages, including the use of low cost materials and the simplicity of the production protocol.

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