OC-14

NANOPARTICLES AND MESOPOROUS ALUMINA BY HYDROTHERMAL MICROWAVE

Alina Carmen Tito[a], Carlo Mazzocchia[a], Giovanni Modica[a], and Federica Martini[a]

[a]Chemistry, Materials and Chemical Engineering Department, Politecnico di Milano, P.zza L. da Vinci 32, 20133 Milano, Italy

For catalytic reactions the correlation between catalytic surface properties and the obtained results are clearly evidenced. Some of these properties are strongly connected with the size of the particles constituting the catalyst. The size strongly conditions the specific surface area, the interaction with the support of the catalyst (for supported catalysts) and in addition for structure sensitive reactions [1,2] determines a specific catalytic behaviour depending on the particle diameter.
Consequently among the primary objectives of the catalyst preparation there are the following aspects: high specific surface area, narrow (tight) distribution of the particle size, homogeneous morphology in the surface, univocal crystalline form, reproducibility, cost. The fundamental parameters for the preparation of nanoparticles are: controlling the nucleation rate and the growth rate, homogeneous nucleation. This control is particularly difficult when using conventional preparation method.
The use of microwave allows a better control of such processes [3,4] since it is possible to obtain a rapid nucleation followed by a controllable growth. This work investigates various chemical approaches for alumina synthesis (hydrothermal crystallization of gel obtained from precipitation of $Al(NO_3)_3 \cdot 9H_2O$ / NaOH and hydrothermal homogeneous precipitation with urea at 160 °C and 200 °C).
The hydrothermal crystallization of the gel obtained by precipitation of $Al(NO_3)_3 \cdot 9H_2O$ and NaOH and hydrothermal homogeneous precipitation with urea at 160 °C and 200 °C, give the same phase (boehmite).

References

[1] Y. Takasu, H, Itaya, T. Iwazaki, T. Ohnuma, W. Sugimoto and Y.Murakami, The Roy. Soc. Chem. Chem. Comm., (2001) 341.
[2] K. Bellon, Thierry Caillot, G. Pourroy and D. Stuerga, in Proceedings 2nd Intern. Conf. Microwave Chemistry 4-7 Sept 2000 Antibes (France) p. 347.
[3] Y. Wada, H. Kuramoto, J. Anand, T. Kitamura, and S. Yanagida, in Proceedings 2nd Intern. Conf. Microwave Chemistry 4-7 Sept. 2000 Antibes (France) p. 343.
[4] A. C. Metaxas and J. G. P. Binner, Advanced Ceramic Processing and Technology; Ed. J. G. P. Binner, Noyes publications: Park Ridge NJ, 1990.