

FUNCTIONALISED MESOPOROUS SILICA WITH GAS STORAGE PROPERTIES SYNTHESISED BY CO-CONDENSATION

Ana-Maria Putz¹, Alfonso Policicchio², Giuseppe Conte², Raffaele G. Agostino²

¹" Coriolan Drăgulescu" Institute of Chemistry, Bv. Mihai Viteazul, No.24, RO-300223,
Timisoara, Romania

²Dept. of Physics, University of Calabria, 87036 Rende, CS, Italy
e-mail: putzanamaria@yahoo.com

Abstract

In order to be tested for their gas storage properties, mesoporous silica particles were synthesized by sol-gel method, starting from tetraethyl orthosilicate silica precursor. Besides, the following precursors have been added in different molar ratios: triethoxyvinylsilan, diethoxy(methyl)vinylsilane or methyltriethoxysilane. Ammonia was used as catalyst and hexadecyltrimethyl ammonium bromide as directing agent. The aim of our study is the functionalization with different groups, with the purpose of trying to tailor their performances as gas storage materials. The molar ratio of different functionalized precursors/TEOS is varied in order to obtain different sizes for the pore diameter as for the specific surface area. The hydrogen adsorption data show that the methyl functionalized material was better from the point of view of maximum adsorption capacity for H₂, compared to the other materials. The higher adsorption capacity of the methyl-functionalized sample can be attributed to a strong sorbent-adsorbent interaction, but also to the high specific surface area and big pore volume. From the evaluated materials, only the vinyl-triethoxysilan functionalised materials have an appreciable affinity toward this gas specimen.

Acknowledgements

The authors thanks to Romanian Academy.

References

- [1] A. -M. Putz, A. Policicchio, S. Stelitano, P. Sfirloagă, C. Ianăși, R. G. Agostino, S. Cecilia, Fullerenes Nanotub. Carbon Nanostructures 26 (2018) 810.
- [2] A. Policicchio, G. Conte, S. Stelitano, C. P. Bonaventura, A.-M. Putz, C. Ianăși, L. Almásy, Z. E. Horváth, and R. G. Agostino, Colloids Surfaces A Physicochem. Eng. Asp. 601 (2020) 125040.
- [3] A. Policicchio, A.-M. Putz, G. Conte, S. Stelitano, C. P. Bonaventura, C. Ianăși, L. Almásy, A. Wacha, Z. E. Horváth, R. G. Agostino, J. Porous Mater. 28 (2021) 1049.