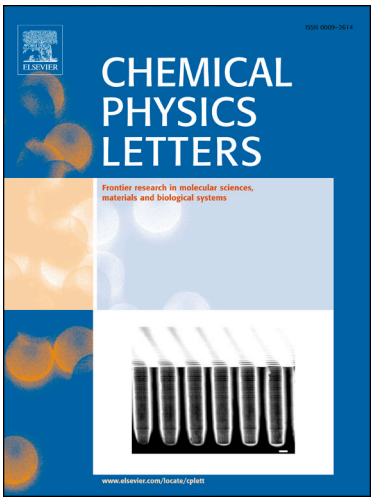

Research paper

Behavior of water and methane bound to hydrophilic and hydrophobic nanosilicas and their mixture

Vladimir M. Gun'ko, Vladimir V. Turov, Tetyana V. Krupska, Eugeniy M. Pakhlov

PII: S0009-2614(17)30973-9
DOI: https://doi.org/10.1016/j.cplett.2017.10.039
Reference: CPLETT 35188

To appear in: *Chemical Physics Letters*

Received Date: 26 August 2017
Accepted Date: 19 October 2017

Please cite this article as: V.M. Gun'ko, V.V. Turov, T.V. Krupska, E.M. Pakhlov, Behavior of water and methane bound to hydrophilic and hydrophobic nanosilicas and their mixture, *Chemical Physics Letters* (2017), doi: https://doi.org/10.1016/j.cplett.2017.10.039

Behavior of water and methane bound to hydrophilic and hydrophobic nanosilicas and their mixture

Vladimir M. Gun'ko*, Vladimir V. Turov, Tetyana V. Krupska, Eugeniy M. Pakhlov

Chuiko Institute of Surface Chemistry, General Naumov Street 17, 03164 Kyiv, Ukraine

ABSTRACT

Methane adsorption onto hydrated (0.1 g/g) initial and compacted nanosilica A-50 and compacted A-50/hydrophobic AM1 (based on nanosilica A-300) and water behavior *vs*. temperature were analyzed using ^{1}H NMR and theoretical methods. Methane adsorption increases with temperature because of changes in structure of mobile water. Stronger compaction of A-50 than that of A-50/AM1 (due to negative effect of AM1 preventing formation of tight contacts between A-50 nanoparticles) leads to decrease in adsorption of methane onto dense A-50 alone. These effects cause the difference in temperature behavior of bound water.

Keywords: Hydrophilic nanosilica; Hydrophobic nanosilica; Structural organization; Bound water; Methane adsorption

*Corresponding author. Tel.: +38044-4229627; fax: +38044-4243567.
E-mail address: vlad_gunko@ukr.net (V.M. Gun'ko)