

Nanocomposites and nanomaterials

Interaction of polydimethylsiloxane/silica nanocomposite with water

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Amorphous fumed nanoscale silica has a complex of properties which allow it to be used as an application sorbent in medicine. Its high osmotic activity is useful for removing edema of the wound in the first phase of the wound process, but it is excessive in the second and third phases of such a process.

In order to regulate the osmotic activity of the sorbent, the effect of adsorption modification of nanosilica with polydimethylsiloxane (PDMS) was studied. For this purpose, PDMS was applied to the surface of nanosilica by gas-phase method in the amount of 100, 200 and 400 mg/g.

It was shown by IR spectroscopy that a monolayer coating is formed on the silica surface with a PDMS content of 200 mg per gram of silica. Features of interactions of the nanocomposites with water for three variants were studied: a) the formation of aqueous suspensions, b) the wettability of the sorbent by the Washburn method using a tensiometer, c) the adsorption of water vapor from the gas phase. It has been found the following.

Modification of the surface of nanosilica with PDMS led in all cases to a decrease in the interaction between the sorbent and water. In variant a), the time of formation of the suspension increased from a few seconds for the initial nanosilica to 30 min for a sample with PDMS 400 mg/g. Washburn wetting speed and the amount of liquid water absorbed in variant b) also decreased several fold. The adsorption of water vapor from the gas phase (variant c) decreased from 11.3 to 2.8 mmol/g, i.e. approximately 4 times.

Acknowledgement: The authors are grateful to European Community, Seventh Framework Programme (FP7/2007-2013), Marie Curie International Research Staff Exchange Scheme (grant no. 612484).