



# 4th World Congress and Expo on Nanotechnology and Materials Science

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## Book of Abstracts

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# Nanotechnology and Materials Science

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## Sponges and aerogels based on carbon nanomaterials

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This research presents the approaches for synthesis and study of aerogels based on carbon nanomaterials (CNMs) and sponges coated with CNMs by “dip-coating”. Composite aerogels were obtained using highly uniform graphene nano-platelets with thickness of 2 atomic layers comparing to  $\geq 4$  layers by the top-down process by microwave-enhanced chemical vapor deposition (MECVD) process (bottom up approach). Based on XPS analyses the MECVD graphene nanoplatelets have no functional groups on its surface and to create the 3D structure of aerogel the binder (carbonized chitosan) was used. MWCNTs were used as well to increase the hydrophobicity of as-synthesized composite aerogels. Composite MECVD graphene/MWCNT/chitosan aerogels are highly hydrophobic with contact angle of  $168^\circ$ . The existence of MECVD graphene nanoplatelets impacts the morphology of surface of aerogel, the average pore sized decreased from few to 10 microns. The sorption capacity of composite aerogels based MECVD graphene/MWCNT/chitosan (1 g) in regard to diesel is 101.3 g. It was found that these materials are good water repellent reusable sorbents for organic liquids. Composite MECVD graphene/MWCNT/chitosan aerogels are highly hydrophobic with contact angle of  $168^\circ$ . The existence of MECVD graphene nanoplatelets impacts the morphology of surface of aerogel, the average pore sized decreased from few to 10 microns. The sorption capacity of composite aerogels based MECVD graphene/MWCNT/chitosan (1 g) in regard to diesel is 101.3 g. It was found that these materials are good water repellent reusable sorbents for organic liquids. Hydrophobic and oleophilic sponges the wall of which are coated with graphene oxide and MWCNTs were obtained by “dip-coating” method. These sponges are highly hydrophobic due to existence of CNMs on their surface, their sorption time is fast and they can be easily regenerated by squeezing and heating. Sponges coated with MWCNTs followed by sticking them on the surface using PDMS are more stable to aggressive influences of organic liquids comparing to the GO-coated sponges without using any polymers. The possibility of use these CNM’s coated sponges as a superhydrophobic and supeoleophilic filters on combined vacuum-oleophilic installation for collection of organic liquids from the surface of water is studied.

### Biography:

F.R. Sultanov is a PhD-student of al-Farabi Kazakh National University and Junior researcher of Institute of Combustion Problems (Republic of Kazakhstan, Almaty). Scientific interests are in synthesis of carbon nanomaterials and 3D structures based on them.