



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

April 05-07, 2017  
Barcelona, Spain

# 2017

## Book of Abstracts

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## Carbon nanotubes on glass-cloth: new electrically conductive textile

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Electrically conductive cloths found their wide application and are actively used in a life and technology. In this work presents results of the synthesis of carbon nanotubes on catalysts based on glass-fibers. To prepare the catalyst, glass-fibers is impregnated with solutions of salts of cobalt nitrate or iron nitrate and glycine (reducing agent) and heated at 500 °C during 1 hour. Thus there is a solution combustion process and the formation of metal oxide nanoparticles (10 – 50 nm) on the surface of glass-fibers. The content of the active component is 1 – 5 wt. %. Synthesis of carbon nanotubes carried on the CVD-installation. Samples of carbon nanotubes were investigated by SEM, TEM and RAMAN – spectroscopy. For the glass-cloth with Co<sub>3</sub>O<sub>4</sub> (5 wt. %) the CNTs with diameter of 14 – 25 nm are formed. For glass-cloth with Fe<sub>2</sub>O<sub>3</sub> (2 wt. %) the CNTs with diameter in the range of 8 – 25 nm are formed. CNTs on glass-cloth have a resistance  $R = 0.3636 \Omega/\text{cm}^2$ . The current-voltage characteristics of carbon nanotubes on glass-fibers were investigated. CNTs on glass-cloth are good conductors of electrical current, which gives an effective Joule heating. Therefore, glass-cloth with carbon nanotubes is electrically conductive smart-textiles and may be used for manufacturing the heating element. For this end, for electrically conductive fabric electrodes from metal wire are made and connected to the battery. On the basis of conductive smart-textile, model of soldier with a heated jacket was made. Before connecting to a power source, the temperature of the heated jacket was 28 °C, after connecting the jacket to a power source, the temperature increase to 36 °C, while increasing the capacity of the temperature rose to 45 °C. In the case of applying a protective polymer coating on the obtained smart textiles, can be produce products heated to a temperature of 700-800 °C, since it eliminates the possibility of interaction between the carbon nanotubes with atmospheric oxygen.

### Biography:

G.T. Smagulova 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 nanotubes and their application.