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BOOK of ABSTRACTS

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Detecting VOC with Different Polymer-Nanostructured Carbon Composites

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Newest researches show a large amount of volatile organic compounds (VOC) used in manufacturing. Mostly workers can't detect VOC as soon as it's needed, creating more health problems and if VOC concentration in air is high enough it can be lethal. Therefore advanced polymer-nanostructured carbon composites have been developed, where ethylene vinylacetate (EVA) copolymer (content of vinylacetate (VA) is 40%; Sigma Aldrich) has been used as matrix. Graphitised nanoparticles (carbon black - CB) PRINTEX XE-2 with average particle size 30nm were used as conductive filler in one part of samples. Particles specific surface: 950m²/g and DBP (dibutyl phthalate) adsorption: 380ml/100g. In other samples as conductive filler was used short multiwalled carbon nanotubes (SMWCNT). SMWCNTs were obtained from CheapTubes; outer diameter is 50-80 nm, inner diameter is 5-15 nm, length 0.5-2 μm. The SMWCNT specific surface area is 40 m²/g, electrical conductance 100 S/cm.

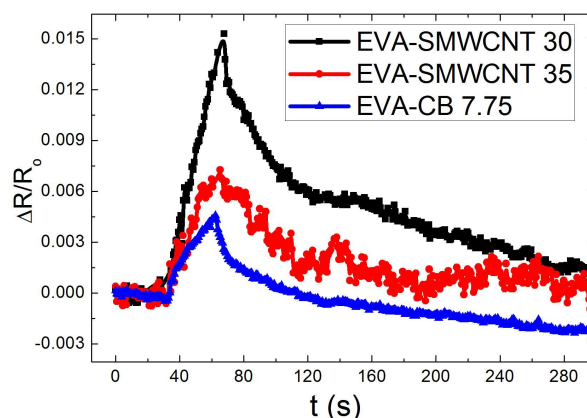


Fig.1 Relative electric resistance change in ethanol vapours (2000ppm) versus time (sample thickness is 70 μm). Sample exposed in vapours 30 seconds.

Both composite types were exposed to ethanol vapour (see Fig. 1). Results show that the best of the EVA-SMWCNT composites has higher sensitivity to vapours than the best of the EVA-CB composite. This can be explained by the specific character of the conductive SMWCNT grid inside the composite.

Additionally, the EVA-CB composite was exposed to fuel vapour. It was found that EVA-CB is able to distinguish different oil-based products – petrol (with octane number 95) and diesel. When EVA-CB was exposed to petrol vapour, the composite's relative electric resistance change was much larger compared to diesel vapour. The observed difference in the composite response is explained by the volatility of different fuel types.