Ethylene vinylacetate copolymer and nanographite particle composite as organic solvent vapour sensor

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Many composite material properties depend from its matrix material. For this reason ethylene vinylacetate copolymer was selected as matrix material due to its complex structure. Copolymer consists of ethylene and vinylacetate repeating units, where ethylene unit is non-polar and vinylacetate – polar. Copolymer structure indicates that the acquired composite material sensor could detect both polar and non-polar organic solvent vapours.

As electrically conductive filler material has been used graphitised nanoparticles (carbon black - CB) PRINTEX XE-2 with average particle size 30nm. Particles specific surface: 950m^2/g and DBP (dibutyl phthalate) adsorption: 380ml/100g. With the term "nanographite" can be marked following fillers: extra-conductive highly structured carbon black (EHSCB), thermally exfoliated graphite (TEG) as well as recently discovered graphenes because all of them have a sp^2-hybridized crystal structure like graphite, but at least one dimension of nanographite is smaller than 100 nm. In this research we used EHSCB as composite filler. Their primary nanoparticles are made of graphite platelets and therefore are extra-conductive.

Electrically conductive ethylene vinylacetate-nanostructured carbon composites were made and tested in various VOC at different concentrations. It has been established that composite samples detect various VOC and showing different sensoreffect. As mentioned matrix material consists of ethylene (non-polar) and vinylacetate (polar) repeating units, therefore tested samples detect both polar (ethanol) and non-polar (toluene) organic solvent vapours and based on composite matrix complex structure sensoreffect in toluene vapours was much higher. This could lead to sensor which is able to differ one VOC from another.