CHARGE TRANSFER IN SEMICONDUCTOR POLYOXIDIC SYSTEMS WITH FRACTAL STRUCTURE

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Development of supersensitive systems of early detection of the center of ignition of the combustible materials (CM) for the gas fire of detector (GFD) is an actual problem of ensuring fire safety of buildings and constructions. Earlier by us it is established that only semiconductor (SC) sensors can be used at the same time for identification of products of pyrolysis and control of change of concentration of fire-explosion safety and toxic gases. Therefore in work it is offered to use as the sensitive element (SE) for GPD – the sensor about semiconductor sensitive element (SCSE) of the helicoid type (HT) created on the basis of available and cheap materials (SnO2, In2O3, Al2O3, TiO2), without use of precious metals (Pt, Ru, Au, etc.) as catalysts of adsorption of molecules of gases.

The model of conductivity of similar gas-sensitive sensors is based on representation that the sensors possessing high porosity, are considered as disorder system of oxidic clusters of nanometric scale therefore in such structures there are no concepts of a zone of conductivity and a valent zone that is very close to model of "hopping" conductivity. From here the assessment for conductivity is received and the relative increase in conductivity of a SE of SCSE HT is found at adsorption of molecules of gas.

By calculations it is established that conductivity of a SM sharply (as double indicative function) increases with increase in fractal dimension of CS.

Nature of dependence of relative increase in conductivity of SCSE HT from change of its fractal dimension (ΔD) will well be coordinated with results of experiment. It is shown that at reduction of fractal scale (the sizes of clusters) δ sensitivity of SCSE HT on concentration of gas and on time of reaction of adsorption increases.