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Their correlation with the average coordination number (Z) has been discussed. The number of constraints per atom (N_{co}) as a function of the average coordination number has been calculated by some theoretical arguments and the average bond energy $\langle E \rangle$ was received according to Tichy equations.²

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P016 – Controllable preparation of silver small particles for electronics

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Keywords: silver, small particles, electronics

As a good conductor, silver powder is the main element of conductive pastes. With the development of microelectronic industry, the size and shape controlled fabrication of silver micro/nano particles is more important. Here we would introduce the controllable synthesis of super-small particles of silver, particularly, the precipitation of multi-injects and process control method.

Furthermore, a relatively high concentration (0.093 M) of silver nanoparticles sized 5 nm was directly synthesized in water phase. The ink (20% silver) prepared with the silver nanoparticles could be written on weighing paper by a pen-on-paper paradigm. The influence factors of the conductivity of the patterns from the ink were studied.

P017 – Controlling gas sensitivity of spinel ferrites

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Keywords: Spinel ferrite, gas sensors, sol-gel

Recently it was found, that gas sensitivity of spinel ferrite transition metal oxide nanomaterials is affected not only by chemical composition and microstructure but also by faults and defects in the structure. Concentration of the point defects such as cation or oxygen vacancies can be regulated by replacing trivalent iron ion in tetrahedral site in the inverse spinel structure with divalent non-transition metal ions (Me^{2+}), thus changing the type of structure to mixed or normal. Also, cation and oxygen vacan-

cies can be introduced or extinguished varying iron ion stoichiometry, synthesis parameters or method, as well as annealing conditions.¹⁻³

Present work shows ways towards a more sensitive inverse and normal spinel type ferrite gas sensor materials including formation of 3D and 2D nanostructures. Spinel type ferrite gas sensor materials were synthesized by using sol-gel combustion and spray pyrolysis methods. For characterization of gas sensor material, X-Ray diffraction, scanning electron microscopy, DC resistance and impedance spectroscopy (IS) measurements were employed.

The tuning of sol-gel auto combustion reaction character results with formation of nanoparticles with different size, nature of agglomerates (primary or secondary), as well as impurity and defect content. Spray pyrolysis derived stoichiometric and non-stoichiometric spinel ferrites with nanosized 2D structures with different thicknesses ranging from nano- to micro-. Complex impedance spectra enabled to separate electric properties of different phases (grain and depletion layer) of the ferrite gas sensor materials. Also, IS helps to find equilibrium between optimal concentration of the surface oxygen species and charge carrier (defect) concentration.

Overall, gas sensitivity is higher for n-type zinc ferrite than nickel or nickel-zinc ferrites and increases with increasing concentration of oxygen vacancies. Thin film gas sensors possess faster response-recovery behaviors and higher sensitivity.

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P018 – Crystallization and dielectric properties of barium titanate precipitated in inverse sodium-aluminoborosilicate glasses with high concentration of iron oxide

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Keywords: barium titanate, iron oxide, crystallization, microstructure, dielectric constant