The Film Materials of Sensor Technique: Solid Solutions, Eutectics, Pseudoalloys

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Classification film materials in terms of their relationship structural phase state and electrical and magnetoresistive properties was performed. The classification assigned degree of mutual solubility of atoms in the two-component film systems received simultaneous condensation or layers of multilayer films with subsequent heat treatment to 900 K. The comprehensive research of crystal structure, thermal and magnetoresistive properties can offer the following classification of film materials.

1. ***Solid solutions with unlimited solubility component:*** film materials based on Fe and Cr; Cu and Co; Fe and Pd or Pt; Co and Pd or Pt. In [1] presented some results of research of electro- and magnetoresistive properties of these films.

2. ***Eutectic based non-annealed film materials with limited solubility***, film materials based on Ag or Au and Co or Fe; Co and Cr. Since the films solubility component has a higher value compared with bulk samples, we implemented a stabilization granular alloys [2] in individual crystallites eutectic, as there may be excess concentration of atomic magnetic components. It must be emphasized that the granular state (correct to call it quasigranulare) can be realized not mentioned in "classic" version, and by condensation of magnetic metal island films between the lower and upper layers of nonmagnetic metal. An example of such a film structure can be Pd (Pt) / island film Fe (Co) / Pd (Pt), in which we observed the effect of GMR.

3. ***Annealing film systems with limited solubility components and granulated condition***: film materials based on Ag or Au and Co or Fe; Co and Cr; systems of this type should be classified as quasieutectic.

We analyze the possible use of considered film materials as sensitive elements of the spin-valve structures and temperature, pressure, strain and magnetic field sensors.

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2. I.Yu.Protsenko, I.V.Cheshko, L.V.Odnodvorets, D.M.Kondrakhova, O.V.Pylypenko, Yu.M.Shabel'nyk, O.V.Vlasenko // *Uspehi Fiziki Metallov*, 14, № 3, pp. 229 – 258 (2012).