Effect of substrate temperature and annealing process on the transport property of $Al_{0.87}Mn_{0.13}N$ thin films

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Abstract: Magnetic semiconductor $Al_{0.87}Mn_{0.13}N$ thin films were synthesized by DC reactive sputtering at various temperature from 27 to 400 ?C The film thickness is topically about 800 nm range. The resistance measured at the temperature range from 120 to 300 K. We present in this report the effect of the substrate temperature and the annealing process on the conductive property of the samples. In all investigated samples, the temperature dependence of the resistivity exhibit a semiconductor behavior, e.g., R ? exp(E_a/k_B T). The values of the activation energy, E_a, obtained from the data fit of the resistance as a function of temperature, decrease with increasing substrate temperature. On the other hand it increase with increasing post-annealing temperature. These behaviors can be attributed to the change in the impurity band dependent on deposition and post-annealing temperature.

Author Keywords: Diluted magnetic semiconductors; Magnetic properties of thin films; Transport properties

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