PREPARATION AND CHARACTERIZATION OF Mn-Co-Ni-O THIN FILMS

C.C.Kao, C.J.Peng, J.S.Bow, H.H.Yen, L.J.Lin, J.C.K.Soong

Materials Research Laboratories, Industrial Technology Research Institute, Chutung 31015, Taiwan, R.O.C.

NTC (Negative Temperature Coefficient) polycrystalline Mn-Co-Ni-O thin films with Mn:Co:Ni composition at 30:60:10 were prepared by RF reactive sputtering process. The 6" sputtering targets were prepared by a slurry coating method using NTC powders obtained from solid state reaction. RF input power at 300W and O2/(Ar+O2) sputtering gas ratio at 0.09 sccm were used. Effects of annealing temperature on the TEM microstructure and electrical properties were investigated.

Annealing the samples at 700 C for 30 minutes, polycrystalline thin films with spinel structure and with good adhesion to the glass substrates can be obtained. The 700 C annealed thin film has a B-constant about 3014K,which is close to that of the bulk material value of 3176K. This thin film shows very fast thermal response, which is suitable for temperature sensors (NTC thermistors). The possibility to make a monolithic sensor with these approaches appears to be good.