

Prediction of the Surface Oxidation Process of AlCuFe Quasicrystals by Using Artificial Neural Network Techniques

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Abstract: In this paper, we present a method to determine the inputs of a manufacturing process used in Microelectromechanical System (MEMS) that will drive its output to desired targets. This method uses a combination of artificial neural network (ANN) modeling and the inverse control together with optimization techniques in order to obtain the minimum error between the neural net results and the desired values. The problem aims to find the depth of thin film layer that we needed for the surface oxidation for the preparation of i-AlCuFe quasicrystals, which is the output of the process, by giving the percentage of oxygen concentration and temperature, which are the inputs of the process. The outputs are related to the inputs of the process by an artificial neural net model which is trained and tested with historical input-output data. The final results of the developed neural net model and the inverse control techniques show high level of the accuracy of the results.

Keywords: : Artificial Neural Network, MEMS, Oxidation, Optimization, Quasicrystals, i-AlCuFe, Inverse control.