Nano films of linear-chain carbon with embedded metal and nonmetal atoms: characterization and data mining modeling

Abrukov S.V.*, Kochakov V.D., Telegin G.G.

Chuvash State University, Cheboksary, 428015, Russia
**e-mail: abrukov@yandex.ru*

Currently a lot of experimental data on properties and characteristics of various nano materials are obtained. The question is how we can summarize it and present in the form of common models allowing descripting the characteristics of previously studied nanomaterials? It is obvious that the characteristics of nano materials related to the composition of nano materials and type of components, manufacturing technology, the shape and size. The question is how we can generalize these links as a computational models that allow to determine the characteristics of the nano materials without carrying out additional experiments? Even more important question is it possible to predict what should be the nano material (structure, components, and dimensions) and what technology should be used with to provide the required properties and characteristics of nano materials?

In this paper we present the first results of application of Data Mining (DM) [1] to create such models. They are based on experimental results for the characteristics of nano films of linear-chain carbon (LCC) with embedded into (LCC) metal and nonmetal atoms (LCC MNA). For the first time LCC MNA were manufactured in the Chuvash State University [2] using a variety of know-how. The direction of work can be of great interest for creation of active and passive elements of solid-state electronics [3], sensors, medical applications, etc.

To date we have developed two computational models that allow predicting the physical-electrical properties of LCC MNA as a function of atoms embedded in a LCC: 1. The model “Steepness and Saturation Current of the current-voltage characteristics vs. Kind of Embedded Chemical Elements”. 2. Generalized model of "Current-Voltage Characteristics of the LCC MNA”. The latter model allows to predict the current-voltage characteristic of any new sort of LCC MNA.

[1] Rios Daniel, (2010) Neuro AI - Intelligent systems and Neural Networks. http://www.learnartificialneuralnetworks.com.

[2] Kochakov, V.D., Novikov N.D., Yablokov M.Y., Eremkin A.V., Vasil'ev A.I., *Actual Problems of Arts and Sciences* N 12, 17 (2009) (in Russian).

[3] Novikov, N.D., Kochakov, N.D., Telegin G.G., *Nanotechnology* N 2. 3 (2006) (in Russian).