$C_{60}(FeCp_2)_2$ based composition material for the potential medical application

A. Soldatov[1], E. Shpilevski[2], G. Gorokh[3], A. Pushkarchuk[4, 5], A. Khrutchinsky [5], S. Kuten[5]

[1]State Scientific and Production Association "Scientific-practical Materials Research Center NASB", Belarus;

[2]Lykov Institute of the Heat and Mass Transfer of the NAS of Belarus, Belarus;

[3]Belarusian State University on Informatics and Radioelectronics, Belarus

[4]Iinstitute of Physical Organic Chemistry NASB, Belarus;

[5]Institute for Nuclear Problems, BSU, Belarus

Fullerene-based molecular solids have been attracting continuous interest due to their unique electronic, magnetic, and biological properties. The medical application of fullerene and the derivatives was studied in the work [1] where the authors concluded that there is a possibility to apply these compounds as the anticancer drug, the antibacterial agent, the antiviral agent. Ferrocene derivatives in particular ferrocenium salts demonstrated antitumor activity [2, 3]. In this work we synthesized composition material based on the nanoporuos Al_2O_3 and the $C60(FeCp_2)_2$ uniform particles. The influence of the pore diameter on the fulleride particle size was discussed.

Single crystalline nanosize specimens of $C_{60}(FeCp_2)_2$ were grown from the solution of a stoichiometric mixture of C_{60} and ferrocene in benzene by slow evaporation at 300 K on the nanoporuos Al2O3 substrate. $C_{60}(FeCp_2)_2$ crystallization occurs inside nanopores as well as on the substrate surface. Inside nanopore crystallization takes place mainly on the bottom. The crystal sizes correspond basically to the pore diameter and vary between 20 and 50 nm.

So we can conclude that the $C_{60}(FeCp_2)_2$ based composition material with quite uniform distribution of the fulleride particle size can be formed by crystallization from the benzene solution on the nanoporous substrate.

1. M. Tadahiko, Farumashia, 40, 1023-1027 (2004).
2. P. Kopf-Maier, H. Kopf, and E. W. Neuse, Angew. Chem. 96, 446-447 (1984).
3. P. Kopf-Maier, H. Kopf, and E.W. Neuse, J. Cancer Res. Clin. Oncol. 108, 336-340 (1984).

NOTES

Two level system dynamics modelling near real nano- and microstructures

A. Maloshtan [1, 2], C. Kremers [2], D. Chigrin [2]

[1] Institute of Physics NAS Belarus, Belarus;

[2]University of Wuppertal, Deutchland

In this report we discuss the Green function's approach to the problem of two level system interaction with real nano- and microstructures. The method is based on description of the electromagnetic environment by mean of Green functions of Maxwell equations with subsequent applying collective operator technique and algebraic solution of obtained motion equations for two level system. The main advantage of the proposed method is that it does not involve any approximation or assumptions on Green function spectrum. As the examples of proposed approach applications we consider two level atom evolution in the two and three dimensional photonic crystals and near the metallic nanoantenas. The Green function's were calculated by FDTD method for dielectric systems, by semi-analytical approach for metallic nanoantenas and by FEM technique for complex metallic nanoobjects.

NOTES