

**(Nanochemistry and Nanobiotechnology)**  
**Physicochemical characteristics and**  
**antitumor effect of nanodiamond**

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The recent studies show that presence of nanodiamond in the organism of mammals is tolerated by them [1]. The interest in medico-biological practice efficiency but also with regard to decrease in side effects, i.e. complications in the course of the medical treatment. The aim of our study was to investigate physicochemical properties of nanodiamond and antitumor effect of nanocomplex from nanodiamond with drug doxorubicin. The paper contains the results of the studies of DHA type nanodiamonds ND (Alitex, Czechia) and ASUD-95 (AlitCompany, Ukraine), which were synthesized using the detonation method of high explosives trotyl/hexogen GH 40/60 by “dry” and “wet” ways of synthesis with negative balance of oxygen. The composition of NC included the antitumoral antibiotic of anthracyclines DR made by Pfizer Italy S.R.L., Italy. The mass ratio between ND and DR in NC is 1,6. The mechano-chemical activation (MCA), mechano-magnetochemical activation (MMCA), mechano-chemical synthesis (MCS) and mechano-magnetochemical synthesis (MMCS) during simultaneous disintegration of particles and electromagnetic irradiation of the powder in dry state were conducted using the mechano-magnetic reactor "MMR1" (NIR R&D, Ukraine). The detonation nanodiamond DND have the properties of soft ferromagnets, and the nanodiamonds ASUD-95 are diamagnets. The DND and nanodiamonds ASUD-95 change their magnetic characteristics multidirectionally under the influence of mechano-magnetochemical factors. After the mechano-magnetochemical synthesis the nanosystems based on the diamonds' specimens of DND, ASUD-95 and DR acquire the magnetic properties of the soft ferromagnet. The combined effect of nanocomplex mechano-magneto-chemical synthesized on the basis of detonation nanodiamonds with anticancer drug doxorubicin and local radiofrequency hyperthermia initiated the growth inhibition of carcinoma Walker-256 as compared with mono-effect of nanocomplex and officinal doxorubicin.

1. Schrand A. M., Hens S. A., Shenderova O. A. Nanodiamond particles: properties and perspectives for bioapplications // Solid State and Materials Sciences. – 2009. – 34, № 1. – P. 18–74.