Toxicity of nanodiamonds and its composites in relation to cancer cells, fungus and plants

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Detonation nanodiamonds possess high capacity to adsorption of different compounds and so this material can find an application in different areas of science and industry including bio- and medical fields. Despite of a rapidly growing and developing interest to nanodiamonds the question concerning its toxicity in the relationship to different objects is currently relevant.

In the presentation we summarized the results obtained for nanidiamonds and adsorption composites of nanodiamonds with toxic and non-toxic compounds. Adsorption complexes of nanodiamonds were obtained with benzyldimethyl-myristoylamine-propylammonium chloride monohydrate (Myramistin) that shows high toxic effect as free compound in the relationship to the adhesive epithelial-like MCF-7 cells and fungi namely *Aspergillus niger*. The other nanodimonds adsorption composites were obtained with coal humic acids, that can be uptake by plants and fungi, but do not show toxic effects. The composition of the composites was determined using radiotracer method: in the adsorption study we used tritium labeled Myramistin and coal humic substances obtained by means of tritium thermal activation method.

In the case of nanodiamond-myramistin complex we have observed the decrease in myramistin toxicity in the relationship to MCF-7 cells but binding efficiency of both nanodiamonds and myramistin was preserved in the case of the formation of the composite [1].

It was shown that nanodiamonds in the suspension can be uptake by plants and penetrate into the green shoots through the roots [2]. Humic substances can adsorb on nanodiamonds with formation of the composite with different penetration ability in the relationship to plant. Noted that both nanodiamons and nanodiamonds-humic acids adsorption composites do not inhibit the photosynthesis process, but were slightly toxic to wheat plants under excessive light.

Being adsorb on nanodiamonds humic substances together with Myramistin do not affect on the action of Miramistin inhibition of the growth and development of the fungus *Aspergillus niger*. Noted that the inhibition of *A. niger* growth by nanodiamond-Myremistin composite is depends on nanodiamond initial zeta potential. Peculiarity of nanodiamond effects will be discussed in the presentation.

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References

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