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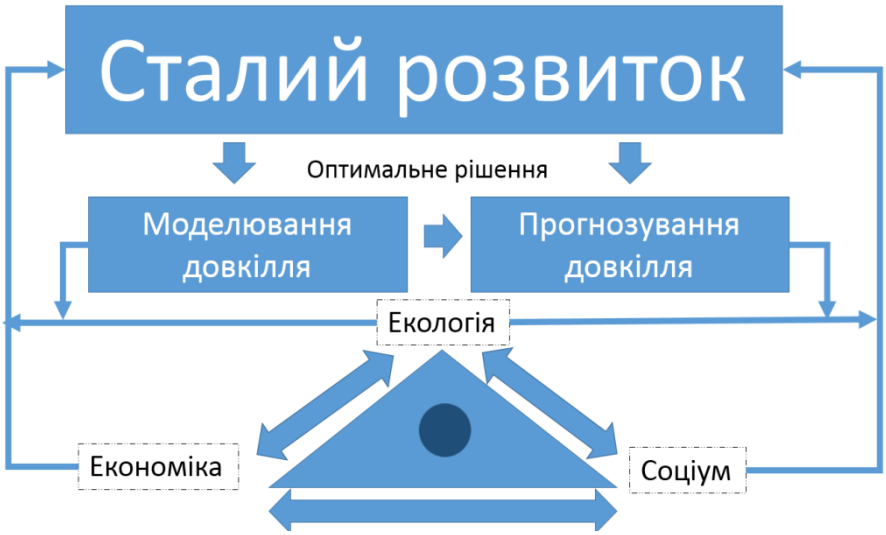

FACTORS AFFECTING «GREEN» NANOPARTICLE SYNTHESIS

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The synthesis of metal nanoparticles by plants is relatively cheap, reliable, environmentally friendly and belongs to the group of methods of «green» synthesis. Vegetable raw materials are optimal for «green» synthesis of nanoparticles for use in various fields [1, 2, 3].

The reduction of metal ions with the formation of nanoparticles is due to a number of factors, including the nature of the plant extract, the reaction medium, temperature, reaction time, concentration and electrochemical potential of the metal ion [3]. The content of active biomolecules, their combination and concentration are due to the nature of the plant extract. The size and shape of nanoparticles play a crucial role in determining the overall biocompatibility. The formation of nanoparticles is influenced by the presence in the environment of compounds involved in bioreduction and stabilization. The pH of the extract is important for the formation of nanoparticles. The change in pH affects the charge of phytoreagents of the natural extract and their ability to bind and reduce metal cations during the synthesis of nanoparticles. As the temperature increases, the reaction rate and the efficiency of nanoparticle synthesis increase. Higher temperatures change the interaction of phytoreagents with the surface of nanoparticles, promote nucleation processes. The concentration of plant extracts and metal ions, as well as their electrochemical potential, play an important role in determining the shape, size and speed of the nanoparticle reduction process. Proteins in the composition of the plant extract significantly affect the formation of nanoparticles. Recently, for the «green» synthesis of metal nanoparticles, approaches have been used that combine the use of plant extracts with the addition of biomatrix - peptides and proteins, the amino acid sequence of which is optimized for efficient production of nanoparticles.

The «green» synthesis of nanoparticles deserves considerable attention due to its environmental friendliness. There is a large body of reports on the possibility of synthesizing nanoparticles from different parts of plants, including leaves, stems, bark, flowers, roots, skins, fruits and seeds. The size and shape of nanoparticles are controlled by physicochemical parameters. A feature of "green" synthesis of nanoparticles are the difficulty of explaining the mechanisms of synthesis, prediction and identification of specific bioreducing and stabilizing molecules. The study of the peculiarities of the synthesis of metal nanoparticles from vegetable raw materials and their specific properties will provide

wide application in biology, medicine, agriculture, as well as in the food industry. All this together will help to improve people's health, life expectancy and quality of life.

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PHOTOCATALYSIS AS A PERSPECTIVE METHOD OF SUSTAINABLE TECHNOLOGY FOR WATER PURIFICATION FROM ORGANIC DYES

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Last decades are marked with constantly growing pollution of environment in general and water resources as its important constituent part. This trend is a serious challenge all over the world and requires adequate response from science and technology. One of the ways to solve this problem is the destruction of pollutants, i. e. their transformation to substances that are not harmful for living creatures. In the case of organic pollutants such final substances are water and carbon dioxide.

Among all the pollutants dyes are rather widespread; they are present in wastewater from textile industry. That is why it is urgent to develop techniques for destruction of dyes. Photocatalysis provides wide opportunities of such destruction and does not lead to additional contamination. Titania TiO_2 is the most popular photocatalyst and is completely inert in biological aspect, but its efficiency is not very high. Modifying titania with various inorganic dopants may lead to enhancement of its photoctalytic efficiency [1, 2] and thus to solution of dye impurities in wastewater.

The aim of our work was to obtain nanosize materials based on TiO_2 with tin and carbon ($Sn/C/TiO_2$). Their photocatalytic activity was investigated in the reaction of organic dyes (safranin T (ST) and rhodamine B (RB)) destruction under visible light irradiation.

It was found that irradiation of these dyes with visible light in water solution when photocatalyst is absent doesn’t lead to photodestruction. Nanocomposite samples $Sn/C/TiO_2$ showed higher photocatalytic activity in the destruction of organic dyes ST and RB under UV and visible irradiation compared to pure titanium dioxide. The total destruction of ST and RB was confirmed by high separation mass spectrometry.

The increased activity of the $Sn/C/TiO_2$ samples is associated with the participation of tin and carbon in the inhibition of electron–hole recombination, prolongation of charges lifetime, increasing of efficiency of interfacial charge separation from TiO_2 to carbon, and formation of doping electronic states.

Photocatalytical activity of different samples did not vary substantially during 5 cycles of exploitation. Accordingly, those nanocomposites are perspective materials for environment-friendly