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THE USE OF NANOPARTICLES FOR REMEDIATION OF THE ECOLOGICAL ENVIRONMENT OF UKRAINE CAUSED BY WAR

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One of the most discussed topics in Ukraine today is the war and the environment. Millions of tons of emissions are released into the atmosphere - fine dust, heavy metals, oil spills, non-metal oxides, aldehydes, anhydrides, etc. Removal of pollutants is usually problematic due to the complexity of the mixture of compounds, high volatility and low reactivity. New technologies and nanomaterials are being developed for environmental remediation, and they are gaining considerable attention due to the unique physical properties of their materials, including increased reactivity and efficiency due to their higher surface-to-volume ratio compared to bulk counterparts. The surface of nanomaterials can be supplemented with functional groups to act on specific molecules for effective recovery (Tsekhmistrenko et al., 2022).

The cleaning materials themselves should not be pollutants after use, given that the use of biodegradable materials does not create waste materials, does not require additional removal after treatment and offers a greener and safer alternative to environmental remediation. Capture of specific pollutants, cost-effectiveness, easy synthesis, use of environmentally friendly green chemistry methods, non-toxicity, biodegradability, recyclability and regeneration are the main issues in the development of new nanomaterials for environmental remediation. Capture of specific pollutants, cost-effectiveness, easy synthesis, use of environmentally friendly green chemistry methods, non-toxicity, biodegradability, recyclability and regeneration are the main issues in the development of new nanomaterials for environmental remediation. However, despite their advantages, some nanomaterials are unstable under normal conditions, requiring special methods of preparation, additional manipulations to prevent agglomeration, increase monodispersity and stability, and can be toxic and produce by-products (Kamilov, 2023; Tsekhmistrenko, 2022).

There are several engineered nanomaterials (carbon nanotubes, nanocomposites, quantum dots, fullerenes, quantum wires and nanofibres), a wide range of commercial products (metals, ceramics, polymers, smart textiles, cosmetics, sunscreens, electronics, paints, varnishes) for which nanomaterials are purposefully manufactured to achieve specified characteristics, and natural nanoparticles (dust, wood and diesel combustion products) (Kamilov, & Valikhonov, 2023).

Nanomaterials (inorganic, carbon and polymeric) that can be used for environmental remediation can improve the environmental situation in Ukraine.

References:

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