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Removal of metal nanoparticles colloidal solutions by water plants

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Selection of species of aquatic vegetation for phytoremediation of water engineering polluted with metals and their nanoparticles is primary need today due to the rapid involvement of nanotechnology products in all areas of industrial production. Water macrophytes that have high adaptive properties and can support normal livelihoods in the technical industry waters and thus can effectively remove metals, including their nanoparticles from mixtures of pollutants require careful study.

We studied the morphological changes, the content of photosynthetic pigments (chlorophylls and carotenoids), biomass increase and determined productivity (net and total) of seven species of aquatic plants (*Limnobium laevigatum* (Humb. & Bonpl. ex Willd.), *Pistia stratiotes* L., *Salvinia natans* (L.) All., *Elodea canadensis* Michx., *Najas guadelupensis* (Spreng.) Magnus, *Vallisneria spiralis* L. and *Riccia fluitans* L.) at overall action of metal nanoparticle colloidal solution (Mn – 0,75 mg/L, Fe – 0,66 mg/L, Cu – 0,37 mg/L, Zn – 0 44 mg/L, Mo – 0,60 mg/L, Ag $+Ag_2O$ – 0,75 mg/L) mixture. Metal nanoparticle colloidal solutions studied were obtained by dispersing metal granules by pulses of electric current with an amplitude A 100-2000 in water.

The ability of aquatic plants to extract nanoparticles of metals from colloidal solutions and remediative potential of investigated species was determined. Higher stability of the pigment system, better growth and higher productivity of plant biomass at the presence of high nanoparticle concentrations in water, and thus higher remediative potential three types pleystofits (*L. laevigatum*, *P. stratiotes* and *S. natans*) were established. Analysis of 21 element contents including metals of nanoparticles (Mn, Fe, Cu, Zn, Mo, Ag) investigated in samples of water before and after exposure to plants showed significant differences when using just pleystofits.

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