

This work focuses on the synthesis of nanoparticles of vanadium, titanium and their oxides. Magnetron-based gas aggregation source was used for nanoparticle preparation. Metallic nanoparticles of vanadium and titanium deposited on substrate were heated at atmospheric pressure which transformed them into oxides. Metallic and oxide nanoparticles are compared in terms of morphology, chemical composition, crystal structure and optical properties. Oxidation of vanadium nanoparticles during short heating times at the temperature of 450 °C is discussed in more detail. It was demonstrated, that ideal heating time for VO₂ preparation is 60 s, the most stable vanadium oxide phase — V₂O₅ — is formed after longer heating. The change of electrical and optical properties with temperature (thermochromic behaviour) was monitored for VO₂ nanoparticles. The V₂O₅ and TiO₂ nanoparticles were tested for their photocatalytic effect and possible use as substrates for surface-enhanced Raman spectroscopy (SERS). It was shown that TiO₂ nanoparticles coated with a thin silver layer can be used as recyclable, enhancing SERS substrates.