

Abstract

This thesis concerns the influence of functionalized silica nanoparticles on the tribological properties of lubricants. It presents the current state of the art on the use of silica nanoparticles as lubricant additives, including a review of scientific and patent literature. It describes the mechanisms of influence of silica nanoparticle additives on the tribological properties of lubricants and identifies existing problems and research gaps, including the need for effective stabilization of nanoparticles dispersed in base oils to prevent agglomeration and sedimentation.

The research section presents the results of experiments involving the introduction of silica nanoparticles (unmodified and chemically modified) into various base oils and lubricants. The effect of nanoparticle addition on the tribological properties (wear scar diameter, welding load, friction coefficient) was determined. The influence of the nanoparticle functionalization method on the stability of the obtained dispersions was also determined.

The confidential section presents the results of application tests, including the effect of the addition of functionalized silica nanoparticles on the properties of engine oil, semi-solid grease and metalworking fluid, as well as the results of tests on the resistance of the obtained additives to ionizing radiation.