# New composite materials prolong the service life of spare parts for equipment and vehicles

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Test of the new hybrid powder materials based on natural layered silicates. Credit: Roman Savin, FEFU

Studies have shown that hybrid powder materials based on natural layered silicates developed by the chemists of the Far Eastern Federal University (FEFU) and the Far Eastern Branch of the Russian Academy of Sciences (FEB RAS) decrease the friction ratio in metals sevenfold. These new materials offer new prospects for the development of more

efficient anti-friction additives, increasing the durability of spare parts for equipment and vehicles.

The work was carried out by research associates of the School of Natural Sciences and Engineering School of FEFU, as well as the Institute of Chemistry of FEB RAS. The research running led by Nikolay Shapkin, professor of the Department of General, Inorganic, and Organoelement chemistry at FEFU. The results were published in *Inorganic Materials*.

The scientists report two hybrid composite materials based on natural layered silicates and plant products. The first was obtained from nontronite silicate isolated from Popov Island in the vicinity of Vladivostok and modified with alkaline rice husk hydrolysate. Experiments have shown that applying this powder reduces the deterioration of friction-producing parts 2.5 to seven times. Another material based on vermiculite from Karelia and modified with regular cellulose reduced the friction ratio 1.6 times.

"Tests have demonstrated that the new materials have good anti-friction properties. There are complex composite materials with better results, but the advantages of our developments are available sources of materials and simple technology. Another benefit of our materials is high heat stability, which favorably distinguishes them from Teflon, for example," said Alexander Panasenko, a senior research associate of the Institute of Chemistry, FED RAS.

The scientists explain that mineral silicates and organic substances of plant origin are combined in the course of mechanochemical activation, which results in the formation of a new crystallic composite material.

"Layered silicates and composite materials based on them have a wide range of practical properties, including sorptive, catalytic, and tribological ones. I hope that further studies in this field will lead to the

development of a metal-ceramic film to protect surfaces from friction," added Professor Nikolay Shapkin.

**More information:** N. P. Shapkin et al, Hybrid Composite Materials Based on Natural Layered Silicates, *Inorganic Materials* (2018). DOI: 10.1134/S0020168518090145

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