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Award Abstract #1456394

SBIR Phase II: Flat ceramic nanoparticles with two functionally different surfaces for self-generating coatings: Scale-UP

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Investigator(s):	Pavlo Rudenko pashar@tribotex.com (Principal Investigator)
Sponsor:	TriboTEX 1008 S East st Colfax, WA 99111-1504 (509)339-3737
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ABSTRACT

The broader impact/commercial potential of this Small Business Innovation Research Phase II project is a new product for improving the performance of existing machinery. If this project is successful, numerous industrial and commercial applications will benefit from increased component longevity and more efficient operation of machinery, coupled with labor and energy savings. From a societal perspective, this technology has the potential to save a large portion of the substantial amount of energy lost to friction in ubiquitous components such as generators and engines, while simultaneously reducing wear-related material/component failures and associated downtime costs. Previous research has predicted that a successful global application of the proposed technology in existing transportation systems will enable an absolute energy savings that exceeds the total energy generated by all currently-deployed photovoltaic, geothermal, and biomass sources combined.

This project will focus on the further development and scale-up of ceramic nanosheets with structurally different sides (sticky/slick), which will be used to form a self-generating tribological thin film coating for improved lubrication. This coating is formed during normal operation, particle by particle. The creation of these low-friction tribological coatings has been previously observed but requires further optimization for robustness and additional engineering and testing for commercial

applications. Understanding the influence of composition and surface dopants is required for market application of the resulting, nearly frictionless coatings. Additional material testing and successful scale-up of the production of these nanosheets are needed for commercial viability. Follow-on applications of these anisotropic nanostructures are envisioned in the areas of catalyst supports, plastic fillers, and smart materials.

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