

## **Dispersion stability and tribological characteristics of TiO<sub>2</sub>/SiO<sub>2</sub> nanocomposite-enriched biobased lubricant**

### **ABSTRACT**

The stable dispersion of nano-additives is highly desirable for the effective lubrication performance of nanolubricants. The compatibility of base oil with selected nano-additives is required for uniform and stable dispersion. This research evaluated the dispersion stability and tribological characteristics of nano-TiO<sub>2</sub>/SiO<sub>2</sub> (average particle size 50 nm) as an additive in a biobased lubricant. The wear protection and friction reducing characteristics of the formulations were evaluated by four-ball extreme pressure tests and piston ring–cylinder liner sliding tests. Surface analysis tools, including scanning electron microscopy, energy-dispersive X-ray spectroscopy, and atomic force microscopy, were used to characterize the worn surfaces. Results showed that the nanolubricants demonstrated appreciable dispersion capability in the absence of a surfactant and an improvement in load-carrying capacity, antiwear behavior, and friction reduction capability.

**Keyword:** Biodegradable base stocks; Nanotribology; Antiwear additives; Friction modifiers; Wear mechanisms