International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

Balapur P.O., Hyderabad – 500005, Telangana, India

Layered two-dimensional graphene nanosheets for nanolubrication

Overview

Lubrication has been an area of extensive research in search to achieve the conditions of a super lubricant i.e. zero friction. Among all approaches, engine friction reduction is a key and relatively cost-effective approach, which has been receiving significant attention from tribologists. However, a large amount of fuel energy is still lost in overcoming friction even after many revolutions in this sector. Carbon nano-additives have the potential to be the replacement to present day additives and give improved results. The quantity of additives in the dispersion is less than the commercial additives by a magnitude of 25-27%. Tribological studies with few layered graphene in an engine oil suspension showed comparable results with the commercial oil. Significant reduction in wear rate and friction was observed for lubricant with graphene nanoplatelets additives. Tests at elevated temperatures at 75°C, with high load and speed of rotation showed similar results of reduction in wear and friction coefficient. The Few-layer graphene nanosheets loaded in a base oil forms thin films over a mating surfaces to minimize the friction-induced effects and can act as thermal conductivity enhancer to transfer heat effectively.

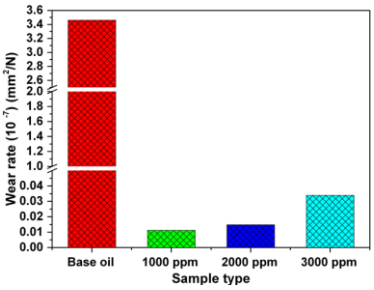
Key Features

- Various kinds of nanostructured carbon materials
- Microwave irradiation for rapid synthesis
- Surfactant-free dispersion in oil
- Minimum quantity lubrication is focused in terms of additive concentration
- Scalable manufacturing process
- Homogeneous dispersion
- Stability for long duration

Digital photograph of few layered graphene dispersed in base oil

Potential Applications

- Engine oils for automobiles
- Regenerative braking system
- As grease additives in high load bearing joints
- Thermal property enhancer in radiator coolants
- Non-corrosive coatings for bottle neck joints



Wear performance characteristic of few layer graphene dispersed in base oil

Intellectual Property Development Indices (IPDI)

- Rheological properties with better stability achieved
- Wear and friction characteristics are validated at laboratory scale
- Application oriented tests on related materials is to be followed up using raw base oil

Status	1	2	3	4	5	6	7	8	9	10

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