

ENHANCED LUBRICATION PERFORMANCE OF PFPE WITH TMFS-MODIFIED MOS2 UNDER HIGH-TEMPERATURE CONDITIONS

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KEYWORDS

Friction; Lubricant additives; Wear, High-temperature lubrication

ABSTRACT

Perfluoropolyether (PFPE) is a superior high-temperature lubricant with distinctive molecular structure and properties, presenting challenges in dispersing other two-dimensional materials. This study focused on enhancing high-temperature lubrication systems by successfully dispersing MoS₂, a representative two-dimensional material, in perfluoropolyether (PFPE) through chemical grafting facilitated by Trimethoxy(1H,1H,2H,2H-perfluorodecyl)silane (TMFS). Compared to pure PFPE, the modified lubricant exhibited a 36.8% reduction in the coefficient of friction (COF) and an 81.6% decrease in wear rate, specifically under conditions of 200°C. The effective modification of MoS₂ improved its performance by promoting homogeneous dispersion, forming a protective tribofilm, and reducing direct peak contact, thereby enhancing lubrication performance, especially under high-temperature friction conditions. This research provides valuable insights for designing high-performance, high-temperature lubrication systems in the future. The achieved results highlight the potential application of MoS₂-modified PFPE in advanced lubrication technologies.

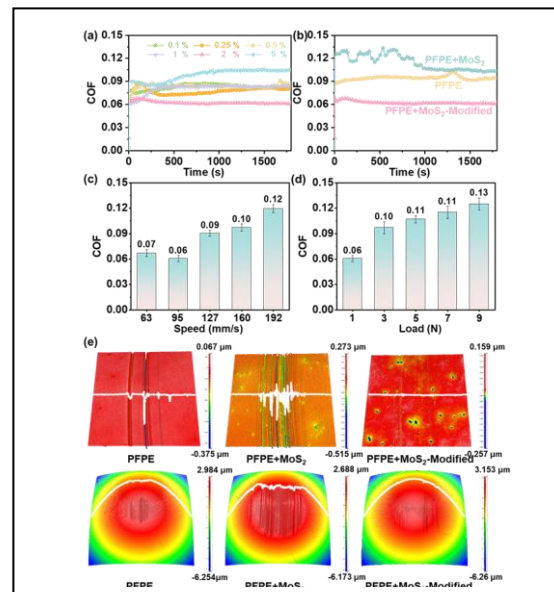


Fig.1 Tribological Performance and Characterization of Various Lubricant Components under Diverse Conditions

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