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Editorial

Tribology of 2D Nanomaterials

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Tribology is the science and engineering of interacting surfaces in relative motion. It includes the study and application of the principles of friction, lubrication, and wear. Tribology is a branch of mechanical engineering and materials science that plays a critical role in the design and maintenance of mechanical systems, as it helps to reduce friction, wear, and energy consumption, as well as prevent damage and failure of mechanical components. Recently, 2D nanomaterials have garnered considerable attention as solid lubricants, fillers of composites, and nanoadditives for lubricants to enhance lubrication and wear protection performances. The use of 2D nanomaterials in tribology is still an active area of research, and researchers are exploring ways to optimize these materials for various applications, including improving their durability and scalability for industrial use.

The nine research articles and two review articles covered in this Special Issue embrace a wide range of topics, from the application of 2D nanomaterials as lubrication nanoadditives for mechanical and biomedical applications to the use of nanofluids with 2D nanomaterials for reduced shear stress and enhanced heat transfer capacity and the tribological performance of thin film and nanocomposites based on 2D nanomaterials. The dispersion stability of 2D nanomaterials as nanoadditives is crucial for lubrication and anti-wear performance, and the synergetic effect between different 2D nanomaterials or between 2D nanomaterials and other types of additives can also lead to enhanced tribological performance. When applied in nanocomposites, the interaction between 2D nanomaterials and other components plays a significant role in the enhancement of mechanical and tribological properties. Overall, 2D nanomaterials provide opportunities for further improvement in lubrication and reduced wear and present an ideal platform for the fundamental understanding of frictional behaviors.

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