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Two main constituents of **tribology** is friction and wear, the control and reduction of both parameters is critical to proper functionality of machine elements. High friction will lead to energy losses, while extensive wear to a catastrophic failure of the mechanical systems. Thus importance of **friction reduction** and **wear control** are important, both for **economic** reasons and **long-term reliability**. The performance of current **mechanical components** made of steel is limited by the tribological properties of the surfaces. In modern and safe machines a **non-ferrous surfaces** are becoming more and more widely used, mainly as **multifunctional coatings** e.g. diamond-like carbon (DLC) coating.

Uncoated components mechanism requires stricter high quality lubricant very often containing toxic additives to enable withstanding high contact pressures and temperatures. **Environmental legislations** intensified requirements by placing limits on the levels of SAPS (sulphated ash, phosphorus and sulphur) in lubricants. These limits seriously question the use of many conventional additives (e.g. zinc dialkyldithiophosphate ZDDP) designed for steel surfaces, which has been used for over 60 years causing the lubricants to become environmentally toxic. The **reason for choosing this research** topic is an European directive towards producing **environmentally sustainable tribological systems**, consist of novel materials/surfaces synergistically interacting with greener additives. **It is** therefore **essential to perform** a basic research and validate if existing traditional additives are effective in reducing friction and wear with non-ferrous surfaces or whether new and possibly better additives can be found.

The **objective** of planned research is the development of a better understanding of the behaviour of green lubricant additives DLC coated surfaces, thereby generating general principles of friction and wear mechanisms for them. The **main aim** of the proposed work is to explore the extent to which some of the key lubricant additives interact with and influence the friction and wear properties of different types of DLC coating. **The hypothesis of the proposed work state that the novel lubricant additives are able to molecularly interact with different DLC coatings in tribological contacts, leading to the formation of additive derived anti-wear tribofilm.**

The **research will be carried** on selected wide range of green additives and different non-ferrous surfaces. First of all frictional and wear performance will be studied in nano-, micro- and macro-tribological tests under lubricated boundary and extreme pressure conditions. Correlation of the surface topography/structure before and after tribotests will allow understanding additive derived tribofilm forming properties. Surface chemical analytics of tested specimens will apprise tribofilm composition, its thickness and tribochemistry of molecular interactions leading to forming of protective layers. Finally general tribodesign rules/theories for non-ferrous surfaces interacting with novel additives based on findings will be generated.