

PREFACE

This thesis work aimed to develop potential eco-friendly biolubricants containing different nano-additives (CCTO, CeO₂, CuO and PTFE) in different amounts to investigate the effect of concentration and shape of nano-additives. Also, the role of a dispersant on the stabilization of nanolubricant and tribo-performance (anti-friction, anti-wear and extreme pressure) was evaluated.

This thesis is divided into seven chapters. The first chapter is **Introduction**, which elaborates the background of the type of lubricants and lubrication, their importance and function, additives and their role, the global and Indian scenario of lubricant and adverse effect of lubricant during its lifespan.

Second chapter, **Literature review**, summarizes the past work done by the various researchers in the field of lubricants used for tribological contact situations. Role of nanoparticles in the lubrication also discussed. Objective of the thesis ends this chapter.

Third chapter, **Materials and methodology**, provides the insights about the materials and their properties, tribo-testing approaches, and brief introduction to the characterization tools.

Fourth chapter, **Tribological evaluation of raw biolubricants**, describes the antiwear, extreme-pressure and antifriction behaviour of the raw biolubricants without any additive. Also, tribological results were correlated with the fatty acid composition of the oils.

Fifth chapter, **Tribological evaluation of biolubricants with ZDDP additive, various oxides and polymeric nano-additives**, reports the effect of different nanoparticles in biolubricants on tribological performance. The obtained results were also compared with

paraffin oil at similar composition level. The reason for enhancement or impaired properties were reported.

Sixth chapter, **Tribological studies of chemically modified biolubricants and their admixture with different nano-additives**, shows the chemical modification of the raw biolubricants to change the intrinsic properties of the oil. Thereafter, tribological performance was compared with unmodified oils at similar compositions.

Seventh chapter, **Conclusions and scope for future work**, summarizes the key finding of the present research work and possible suggested work to carry out in future.