

Functional Carbon-Dots as Effective and Sustainable Lubricant Additives

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Abstract

Carbon dots (CDs) are fluorescent nanoparticles exhibiting physical and optical properties somewhat comparable to those of semiconductor quantum dots (SQDs). However, CDs have exceptional hallmarks in comparison with heavy metal SCQDs: ease of synthesis from carbon-based materials, excellent biocompatibility, non-toxicity, low cost and chemical stability. All these their properties, along with the easy surface functionalization or passivation, make CDs ideal candidates for multiple applications in different areas. In recent years, much attention has been paid to the use of different kind of nanoparticles as lubricant additives [1,2]. In the case of carbon-based nanoparticles (graphene, carbon nanotubes or fullerenes), the dispersion stability in base oils is a problem waiting to be solved. The present work is focused on three aspects: a) the green-synthesis of CDs from glutathione and wasted tea leaves and grape husk, b) CDs surface functionalization to enhance their solubility in non-aqueous media and oils and c) use of such modified CDs as additives to lubricant oils in order to improve their tribological performance and increase the useful life of lubricating oils.

References

- [1] M.Ye, T.Cai, L. Zhao, D.Liu, S. Liu; Tribology International, 136, 2019, 349-359
- [2] K.Zhou (Ed.), Carbon nanomaterials: modelling, design and applications. Taylor&Francis Group, 2020,

Figures

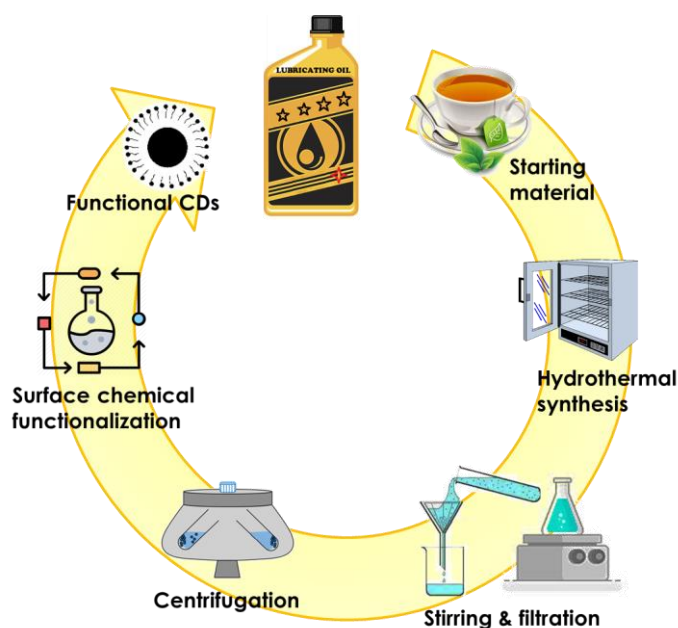


Figure 1: Graphic representation of CDs synthesis from wasted leaves of tea.

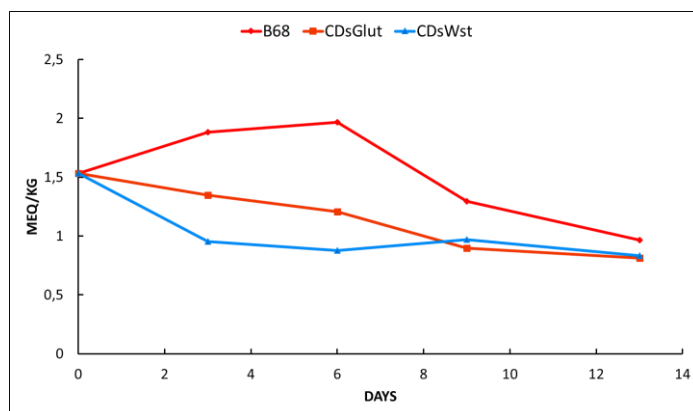


Figure 2: Effect of different functional CDs on the aging of Base oil (B68) quantified by the peroxides formation.