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Physicochemical and tribological properties of microalgae oil as biolubricant for hydrogen-powered engine (Article)

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Abstract

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Hydrogen fuel offers a cleaner fuel alternative to fossil fuel due to more efficient burning as well as reduces the environmental and health issues brought by fossil fuel usage. In engine application, regardless of either pure hydrogen or in combination with air or/and other biofuel, all the moving parts are exposed to friction and wear, and lubricant is used to minimize friction and wear for optimum operation. Thus, in this study, the use of microalgae oil as an alternative biolubricant is evaluated from the physicochemical and tribological aspects. It is found that modified microalgae oil (MMO) has demonstrated great anti-friction and anti-wear potential, particularly the 10% modified microalgae oil blend (MMO-10). The coefficient of friction is reduced (up to 10.1%) and significant reductions of wear loss and surface roughness are obtained in comparison to pure poly-alpha-olefin. Lubricant's heat dissipation is also enhanced with MMO addition, demonstrating great prospect for MMO for hydrogen-powered engine utilization. © 2019 Hydrogen Energy Publications LLC

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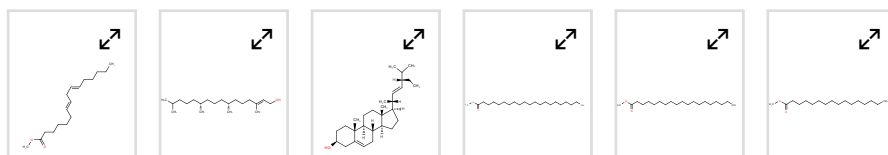
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Author keywords

Adhesive wear Alternative energy Friction coefficient Lubricant additive Microalgae

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