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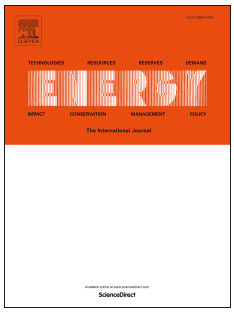

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Catalytic hydropyrolysis and co-hydropyrolysis of algae and used engine oil for the production of hydrocarbon-rich fuel

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ABSTRACT

The catalytic hydropyrolysis and co-hydropyrolysis of algae (microalgae and macroalgae) and used engine oil (UEO) for the production of potential fuels for automobiles were examined. The co-hydropyrolysis of algae and UEO produced oils that possessed slightly higher H and C content, a higher H/C atomic ratio, and an extensively reduced heteroatom (59.78-75.62% for O, 6.98-81.65 for N, and 43.30-86.41 for S) content and O/C atomic ratio compared to the oils that were obtained via the hydropyrolysis of algae, with the exception of oil produced from UEO and *Schizochytrium limacinum* (SL). The co-hydropyrolysis of microalgae and UEO was found to decrease the amounts of saturated hydrocarbons and aromatics present in the oils compared with the hydropyrolysis of the microalgae, except for SP. By contrast, the co-hydropyrolysis of macroalgae and UEO resulted in an increased number of saturated hydrocarbons and a decreased aromatic content in the oils compared with the hydropyrolysis of the macroalgae, except for LM. The co-hydropyrolysis of algae and UEO also led to increased energy recovery ranging from 80.19 to 91.26% compared with the hydropyrolysis of algae ranging from 53.25 to 79.58%. All of the pyrolysis oils flowed well and had similar viscosities of approximately 8.0 mPa·s.

Keywords: hydropyrolysis; co-hydropyrolysis; used engine oil; algae; hydrocarbon-rich fuel

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