

## Hydrothermal treatment and catalytic upgrade of microalgal biomass for biodiesel production

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The conversion process of microalgae to biodiesel traditionally comprises extraction and transesterification of lipids. However, the yield of biodiesel is limited to fatty acid and triacylglycerol contents of microalgae in this way, and storage property of fatty acid alkyl ester is much poorer than paraffinic fuels. An alternative conversion method is hydrothermal treatment (HTT) of the biomass, which "cooks" wet microalgae at high temperatures. As the result of HTT, we obtain biocrude containing various hydrocarbons, which can be upgraded to paraffinic fuels via conventional petroleum refining process. In this study, *Golenkinia* sp. biomass cultivated at large open raceway ponds was treated by HTT at different temperatures (200–350 °C) and upgraded to paraffinic fuels using NiMo catalyst. Although HTT at high temperatures yielded more biocrude than low temperatures, the biocrude from high temperatures contained larger amount of asphaltenes, which deactivated the catalyst and led to lower conversion rates. Therefore, against the conventional belief, optimal temperature of HTT is lower temperatures (near 200 °C) unless asphaltene content can be reduced at higher temperatures.