

Sustainable and environmentally friendly production of algal biofuel using wastewaters

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A suite of technologies for mass production of microalgae on waste streams and converting the harvested algal biomass into drop-in fuels, animal feed and other byproducts have been developed and the summary and preliminary conclusions reached including: 1) local bio-prospecting robust algal strains which adapted well in concentrated municipal wastewater (CMW) and diluted swine manure (DSM), respectively, with high lipid content and high growth rate. These robust strains were identified as *Chlorella sp.*, *Heynigia sp.*, *Hindakia sp.*, *Micractinium sp.*, and *Scenedesmus sp.*. Among them, five strains grown well on CMW and three strains on DSM were chosen for further studies due to their high growth rates of 0.292 - 0.498 d⁻¹ and high lipid productivity of 50-77.8 mg L⁻¹d⁻¹. 2) A low-capital, low maintenance cost and highly scalable hybrid cultivation systems for year-round production of algae in northern climate was developed. 3) An integrated swine manure-based algal platform was developed for sequential biofuel and omega-3 contained algal biomass production especially for animal feed uses. 4) A novel fungi-assisted bio-flocculation technique for low-cost and highly efficient microalgal cells harvesting. 5) Harvested algal biomass was directly converted into bio-oil and upgrading by microwave-assisted pyrolysis and catalyzed hydrothermal liquefaction processes and nutrients from aqueous phase were recycled for algal cultivation. Specific details will be presented and discussed.

Biography

Wenguang Zhou has completed his PhD from Sun Yat-sen University, China and postdoctoral studies from Tsinghua University, China and University of Minnesota, USA. He is leading a algae group at center for biorefinery, University of Minnesota. His present research is mainly focused on the areas of basic and applied bioenergy and is heavily involved in algae to fuel R&D programs including algae development, mass cultivation of algae on wastewaters and optimization, development of photobioreactors, algae harvest, and conversion of algal biomass to biofuels and byproducts through thermo-chemical technologies. He has published over 30 peer-reviewed papers in reputed journals.

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