



PATENT POTENTIAL: CELLULOSE- AND ALGAE-BASED BIOFUELS

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Cellulose and algae seem to be on the lips of almost everyone in the biofuel industry. In fact, these two source materials are often spoken of in a single breath because they offer the greatest promise for next-generation production of ethanol and biodiesel.

The fates of ethanol derived from cellulose and biodiesel derived from oil-generating algae may not only depend on technology breakthroughs and validation, but also on the patent rights surrounding these widely-touted alternative fuels.

Patents confer a limited monopoly (in a given territory for 20 years from filing) for novel and inventive technical advances.

In this first of two columns, I will provide an overarching look at the patent potential surrounding algae-based biofuels.

The general concept of using fast-growing algae to produce oils that can, in turn, be transformed into methyl ester biodiesel is not new in itself. Open-ponds and photobioreactors have been used in the past for cultivating algae with the view of harvesting the oils produced. Improvements could occur in several categories to constitute patentable inventions: improved processes, microalgae strains, bioreactors, and extraction techniques.

Following a 2002 Supreme Court of Canada decision, “higher life forms” are not patentable subject matter in Canada. The Canadian Intellectual Property Office (“CIPO”) has also recently announced its view on the distinction between higher and lower life forms. The CIPO considers lower life forms as unicellular organisms and higher life forms as multicellular organisms. Consequently, unicellular forms of microalgae can be patented *per se*, whereas the CIPO currently would not accept claims to multicellular algae such as a new variety of seaweed.

In the field of algae-based biofuels, Greenfuel Technologies Corp is above the curve from a recent patent filing standpoint. Their international patent applications are drawn to inventions such as photobioreactors that mitigate pollution in flue gases, preconditioned photosynthetic organisms, algae-based biomass production and oil extraction techniques.

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Oryxe Energy International has a plethora of patents particularly related to the extraction of carotenoids and chlorophyll from plant oils such as algae for biofuel additive formulations.

Martek Biosciences Corp, principally a developer of nutritional products, has patented various photobioreactors for microalgae designed as far back as the 1980s.

Various other companies have filed for patents for algae-related biofuel technologies, including Cargill, Yeda R&D, Biodiesel Industries, Algal Technologies, Desert Energy Research, Aquasearch, Bionavitas, Omega Tech and Algae Farms.

Also striking is the number of Research Institutes and Universities that have taken the patenting route in this field.

Whereas much of the algae patenting relates to oil production and separation, some companies have obtained patents related to ethanol production using certain types of algae.

It seems that various players in the nutraceutical, wastewater remediation, agriculture and aquaculture industries hold patents that relate to technologies that are used in their own operations but could also be applicable in biofuel production. Such companies could try to enter the biofuels market themselves born by the sails of their patented technology, or license their patents and know-how to biofuel producers.

Indeed, patent-savvy decisions may not only enable a company to exclusively make, use and sell a patented product but also allow them to license out their proprietary technology to generate additional revenue streams. Companies in the algae-based biofuel industry should assess their patent strategy as the science and economics of algae continue to evolve.

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