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Soaring Patent Activity in Biofuel Technology Part II

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Where is there room for innovation activity in biofuels?

A recent study broke down the types of biofuels being patented into: biodiesel (199), ethanol and other alcohols (29), agricultural biotechnology (51), enzymes (16), and biomass (17).

Corporate entities own 57% of the patent documents; universities, 11%; and undesignated, 32%. Internationally, the five countries most active in biofuel innovation have been the U.S., Germany, Japan, Italy, and France. Within the U.S., the five states with the highest number of biofuel patent documents were, in order, Missouri, California, Iowa, Illinois, and Minnesota.

All three generations of biofuels share cost-effectiveness difficulties. The production of biomass feedstock is recognized as the most significant cost driver in biofuel production.

New ways of turning raw materials into useful fuels are the subject of research programs worldwide. In the case of second-generation biofuels, for example, the raw biomass must be pretreated prior to a fermentation step to deconstruct the lignocellulosic material into smaller molecules. Known pretreatment processes are expensive and leave large amounts of waste products. One approach to replace currently known pretreatment and fermentation processes is to genetically modify feedstock to contain enzymes that break down cellulose directly into ethanol.

Cost-effective methods of producing third-generation biofuels from algae have yet to be demonstrated. As mentioned above, the extraction of algal oil is difficult and expensive. In addition, currently known algal strains do not inherently possess sufficient oil to make them a worthwhile biofuel source. Research is being directed to engineering algal strains that contain larger proportions of oil, and also to designing more efficient extraction methods.

Another challenge is the production of a biofuel that is not entirely ethanol-based, as current vehicles can only use a gasoline mixture containing 10% ethanol without risking damage to engine components. Current efforts are focusing on methods of producing butanol and other fuels that are closer to gasoline or diesel in an effort to further reduce dependence upon fossil fuels.

The future of biofuels

Federal investment in the biofuels sector will be increasing, under a directive of the Obama

administration to the USDA, with more that $1.1 billion being made available. Venture funding is also escalating both in the U.S. and internationally.

The injection of so much capital into an area typically causes research and development to explode. Those with strong patent portfolios will be poised to hold a significant strategic advantage over competitors in the coming decades. This is an exciting era of innovation, as borne out by the growth of activity in biofuels-related pending and issued patents.

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