

Challenges and Opportunities in Harvesting Algae for Biofuels

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Abstract:

Algae is a potential biofuel source of interest for the Southwestern United States because it does not necessarily compete with certain resources in short supply like potable water and arable land. Before algal biofuels can become a reality, substantial cost reductions must be attained and sustainability issues must be addressed. This presentation addresses the initial separation of algae from the water in which they are grown. Traditional separation techniques can be energy intensive (i.e. centrifugation) or involve substantial quantities of chemicals that might be of environmental concern (i.e. flocculation with certain metals). Flocculation is observed to occur naturally, however, and the utilization of this auto-flocculation to separate algae from water is a potentially efficient solution to the algae-water separation problem. This talk addresses the relationship between algae and the water content (salts, sediments, etc.) in terms of the occurrence of auto-flocculation. The propensity of algae to flocculate is related to the properties of the algae surface and its interaction with the water around it. Of key importance is the tendency of algal surfaces to develop a negative charge and the ability of ions in the water to alter the resulting electric double layer in favor of alga-alga adhesion. We have initiated a fundamental scientific study of the algae-water interface and its dependence on water chemistry. The objective is to identify conditions favorable to flocculation that may coincide with naturally or efficiently attainable conditions. This project is in its early stages, and we will present a combination of preliminary theoretical and experimental results.