



U.S. DEPARTMENT OF ENERGY
AlgaePrize
NextGen Algal Innovators

Team Name:

AzCATI

Team Schools/Organizations:

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Abstract:

Low-cost and novel real-time sensor technologies are enabling rapid advancements in data-science, machine-learning, and artificial intelligence for biotechnology improvements. These advancements are just beginning to be integrated with microalgae cultivation. Specifically, microalgae that can be utilized to produce valuable bioproducts such as biofuels, carotenoids, or even monoclonal antibodies (mAbs). Such cultivation is a sustainable and effective method for producing these valuable bioproducts while eliminating considerable production risks.

Utilizing the novel MiProbe biosensor technology principles a low-cost reusable plate-based assay tool has provided preliminary results showing differentiation of metabolic parameters of bacteria and algae within a single plate-based assay. This real-time metabolic monitoring of petri-dish style assays has broad potential across environmental, industrial, and research applications of microalgae.

Using a combination of biosensors deployed in the CAP canal system and industrial-scale processing in open raceway ponds at AzCATI provides real-time information on metabolic processes for further lab-based investigation. The plate-based assay tool may improve pond forensics applications, comparisons of wild and domesticated strains, heterogenous culture optimization, and investigations into stress condition responses.

Environmental sampling of algae bloom monitoring applications could be enhanced by a fast non-selective assay for determining presence of distinct metabolic signature associated with disruptive events from upstream monitoring locations and the cataloging of signatures associated with different dominant species in active blooms.

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It is hoped this tool can further be used to more quickly isolate transformed cells and confirm axenic culture status of algae seed trains, and provide a new platform for rapidly identifying key metabolic information in controlled experiments at a low cost.



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