

Abstract Submitted  
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**Combining micro-structures and micro-algae to increase lipid production for bio-fuel** SAURABH VYAWAHARE, EMILLY ZHU, TROY MESTLER, ANDRÉ ESTÉVEZ-TORRES, ROBERT AUSTIN, Physics Department, Princeton University, Princeton NJ 08544 — 3rd generation bio-fuels like lipid producing micro-algae are a promising source of energy that could replace our dependence on petroleum. However, until there are improvements in algae oil yields, and a reduction in the energy needed for processing, algae bio-fuels are not economically competitive with petroleum. Here, we describe our work combining micro-fabricated devices with micro-algae *Neochloris oleoabundans*, a species first isolated on the sand dunes of Saudi Arabia. Inserting micro-algae of varying fitness into a landscape of micro-habitats allows us to evolve and select them based on a variety of conditions like specific gravity, starvation response and Nile Red fluorescence (which is a marker for lipid production). Hence, we can both estimate the production of lipids and generate conditions that allow the creation and isolation of algae which produce higher amounts of lipids, while discarding the rest. Finally, we can use micro-fabricated structures and flocculation to de-water these high lipid producing algae, reducing the need for expensive centrifugation and filtration.

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