Year 4: Small-Scale Multilevel Bioremedial Water Filtration System (Prototyping)

Naik, Sania (School: Dr. Ronald E. McNair Academic High School)

In a world where water pollution extends well into the domestic world, accessible treatment solutions are more important than ever. Three years of prior research have proven enzyme-assisted microbial remediation an efficient solution to this problem, when applied in conjunction with a larger filtration system design. The objective of this year's design is to materialize a 3D digital blueprint to provide a cost-friendly, effective, and accessible prototype for individuals in third-world countries to drink sanitary water without health risks. Combining a saccharomyces cerevisiae strain, UV light exposure, and the highly available enzyme lipase, the effectivity of a multi-level filtration system in terms of water quality, cost, and system efficiency was gauged. The finished design includes levels for enzyme-microbe maturation, remediation in itself, mixed media filtration, and ceramic filtration by means of a homemade composite unit. The final product is a prototype with fully neutralized water output, void of harmful water hardness and hydrocarbons -- ready for extensive testing and iterations prior to global application. The implementation of such a system in third-world countries as a means of obtaining potable water proves cost-effective through expense calculations and exhibits maximum efficiency in combining purposeful treatment order (of hydrocarbon extraction, distillation, etc.) and prior experimentation. The proposed design holds the potential to transform the means through which such water can be obtained for industrial, domestic, and agricultural use worldwide.