CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)
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Project Number
S0425

Project Title
Pyrotex-Optimization of Protein Polymerization

Abstract

Objectives/Goals
By recreating the salt conditions, pH, and temperature of the original environment of the organism, Pyrodictium abyssi, the canA encoded polymerizing protein, will produce the helix forming proteins more efficiently than with the common laboratory salts magnesium chloride, and calcium chloride used in the original experimental studies.

Methods/Materials
Each cation in the experiments was combined in separate reactions with either calcium, or magnesium. The results of these reactions were collected and further experiments were performed, based on the results of which cations were optimal for polymerization. Each reaction occurred at 80°C along with a primer reactant, consisting of polymerized proteins, to initialize the reaction.

Results
What was discovered is that with these salt variables, the nanotubes had over tripled in length compared to the original controls of the experiment, calcium chloride and magnesium chloride, combined without additional cations.

Conclusions/Discussion
This progress could potentially lead to new breakthroughs in the field of nanotechnology, with countless applications, from areas such as cardiovascular health, to optical fibers in computers.

Summary Statement
The optimization of polymerization conditions of a protein monomer obtained from the isolated Pyrodictium abyssi microorganism, by recreating the salt conditions, pH, and temperature of the original deep sea enviornment.

Help Received
Used laboratory chemicals, centrifuge, and confocal microscope at Diversa Corporation, San Diego, CA., under the supervision of Dr. Eileen O'Donoghue.