TECHNOLOGY

Novel Filamentous Hyperstable Chaperone with Protein and Cellular Stabilization

OVERVIEW

Ethanol, butanol, acetone and many other chemicals have traditionally been employed as a chemical feed stock for a variety of industrial chemicals. However, many of the byproducts produced during fermentation is cytotoxic and limits product generation. The disadvantages of low productivity, low cell density, longer fermentation, and prolonged downtimes have put forth the demand for alternative high productivity systems. The standard method to resolve these issues have been through extractive fermentation, which is a process where metabolites are extracted using a suitable organic solvent to form a two-phase system. The use of solvent extraction to recover products such as alcohols, penicillin, and other antibiotics is a widespread distillation method. However, increasing the output of the final product during fermentation would also be a highly desirable trait. UMB inventors have developed a strategy to improve the ability of microorganisms to produce commercially important chemical compounds that may otherwise be toxic to the organism with the use of heat shock proteins. This would effectively increase the product production of many biochemical processes that are useful in many industrial and pharmaceutical applications.

APPLICATIONS

According to a report by Global Industry Analyst, Inc., the global solvents market is expected to reach 19.9 million metric tons by 2015. Increasing consumption from developing countries are key factors driving the market growth as products for automotives, electronics, and medical products increase to meet demands. The Asia-Pacific region alone reached 6.4 million tons by 2010 growing at a rate of 4.8% from 2001-2010. Product purification and separation is always the most challenging area in the current US solvent industry and the application efficiency determines 50-90 % of final product costs. With increased restrictions due to a shift in oxygenated and green solvents, there is a need for cleaner, more cost-effective methods for solvent production.

ADVANTAGES

-HSPs in engineer microorganisms would increase tolerance to toxic agents, such as industrial organic solvents and increased temperatures. -This system is readily adaptable to large scale cultures for production of industrial quantities using host cells that are currently utilized within the industry

STAGE OF DEVELOPMENT

Initial in vitro viability, growth, and ethanol production studies have been conducted in E. coli strains. Heat and solvent tolerance studies conducted in E. coli expressing recombinant heat shock protein, Methanococcus jannaschii ?-PFD, show enhanced survival.

LICENSING POTENTIAL

UM seeks to develop and commercialize by an exclusive or non-exclusive license agreement and/or sponsored research with a company active in the area.

CONTACT INFO

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PATENT STATUS

-U.S. Patent 8,685,729 issued 04/01/2014 -National Patent PCT/US2008/054978 filed 2/26/2008

CATEGORIES

- Engineering
- Chemical

INVESTIGATOR(S)

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EXTERNAL RESOURCES

- High-temperature fermentation: how can processes for ethanol production at high temperatures become superior to...
- Chaperone action of a versatile small heat shock protein from Methanococcoides burtonii, a cold adapted archaeon.
- Small heat shock proteins from extremophiles: a review.

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