Institut "Jožef Stefan" Ljubljana, Slovenija

TECHNOLOGY OFFER

PROTEIN DEGRADATION METHOD FOR CLEANING OF TEXTILES, SURFACES, AND EQUIPMENT

Fields of use

Cleaning Technology, Soaps, detergents, Enzyme Technology, Protein Engineering, Food Microbiology/Toxicology/Quality Control.

Current state of technology

Under development/lab tested

Type of cooperation

Licensing in the technology for the purpose of application in cleaning formulations and procedures as well as industrial-scale production; entering technical cooperation agreements for the purpose of further development of sterilization procedures and optimisation of enzyme production

Intellectual property

Patent(s) applied but not yet granted, Patents granted

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Summary

Slovenian public research organization has developed an efficient method for degradation of proteins, protein aggregates and deposits by using a thermally stable serine protease. The method is applicable for sterilization of surgical equipment in hospitals, cleaning of textiles, and in molecular biology protocols, and is efficient in a broad range of temperatures, pH values, and in presence of detergents. The researchers seek license or technical cooperation agreements.

Hospital equipment and surfaces contaminated with prions represent a constant health risk since prion proteins are notoriously resistant to high temperature and aggressive detergent treatments, making it difficult to sterilize such equipment using standard procedures. Moreover, there is no effective way to clean protein films in water pipes. There is need of a new, efficient, and environmentally friendly way of inactivation, elimination, and/or degradation of prion proteins. Currently used methods for prion degradation include application of extreme conditions.

The core of the invention solves these problems by introducing a simple and efficient protein degradation method using a thermally stable protease pernisine, obtained from the organism Aeropyrum pernix. The invention further includes a procedure in which pernisine is produced (expressed) in a common laboratory bacterium Escherichia coli (E. coli), and the protein gene sequence is specifically modified to allow for higher yields. The recombinant pernisine, purified from the lysed culture supernatant, is effective against soluble proteins as well as protein deposits.

Recombinant pernisines may be used (i) as replacement of proteinase K in molecular biology purification protocols (including kits); (ii) for sterilization of surgical equipment in hospitals; (iii) for cleaning of textiles (as component of washing powders and detergents); (iv) for removing allergenic peptides in food industry, or (v) for cleaning of solid surfaces with protein deposits (water pipes, bioreactor walls, etc.).

Since the technology aims to reach its full potential in cleaning products, industrial partners, such as detergent producers, are sought. Technical cooperation is sought in order to facilitate continuous development rather than just routine production. License agreements and / or agreements for technical cooperation will enable the researchers to maintain their focus on the research behind the technology whereas up-scaling to industrial level will be carried out in the industrial partner's setting.

Description of the invention

Products made from titanium or titanium alloys are widely used in various applications. One

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The investment is co-financed by the Republic of Slovenia and the European Union under the European Regional Development Fund.

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Main Advantages

• pernisine degrades protein aggregates rapidly compared to other enzymes (in less than 10 min) and is much more effective than the commonly used proteinase K;

• high efficiency allows for degradation of higher concentrations of contaminants;

• pernisine is thermally stable and efficient in a broad temperature range (50-125°C);

• pernisine is robust, it works in a wide pH range (3-10) and in presence of detergents and other denaturants (urea, gvanidinium hydrochloride…);

• pernisine is environmentally friendly compared to aggressive chemical agents;

• pernisine may be used in combination with detergents; • expression in E. coli eliminates the need for extreme cultivation conditions;

• expression in E. coli leads to higher yields (and in shorter time) compared to A. pernix;

• specific modifications allow for simple purification and detection of pernisine. The researchers are among the leading scientists in their respective departments, and regularly publish in high-impact scientific journals. They are experts in the field of protein chemistry and biochemistry, extraction, purification, and isolation of proteins from thermophilic microorganisms, and protein stability studies.

Partner Sought

Type of partner sought: Industry, academy, research organization

Specific area of activity of the partner: distribution of proteins, production of washing powders and cleaning products, sterilization of medical devices (surgical equipment)

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