



Robust Lipases for Industrial Polyester Synthesis (ROBUSTLIPASE)

Ayşem Batur

TÜBİTAK MARMARA RESEARCH CENTER
Food Institute

A Brief Introduction...



- **Speaker:** *Ayşem Batur*
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- **Position:** *Contact Point of TUBITAK MRC Food Institute for Framework Programmes*

- **Organisation's Name:** *TUBITAK Marmara Research Center*
- **Nature of the Organisation:** *Public Research and Technology Organisation (Applied Research)*
- **Country from which it operates:** *Turkey*
- **Department within the organisation:** *Food Institute*
- **Speciality of the Institute:**
 - **Food Science And Technology**
 - **Nutrition**
 - **Functional Foods**
 - **Food Microbiology**
 - **Biotechnology**

Skills and Expertise of the Food Institute



Fields of Activity

- 1. R&D STUDIES**
- 2. TECHNICAL CONSULTANCY**
- 3. TEST AND ANALYSES**



Laboratory accreditation for EN ISO/IEC 17025:2005 by German Accreditation Body (DAR/DAP) since 2001

- 4. TRAINING PROGRAMMES**

Skills and Expertise of the Food Institute



Strategic Business Units

1. FOOD SCIENCE AND TECHNOLOGIES STRATEGIC BUSINESS UNIT

- **Food Processing Technology Group**
 - Cereal Processing Technologies
 - Chemical, Physical and Sensory Characterisation of Foods
 - Fats and Oils Technology
 - Food Enzymology
 - Fruit and Vegetable Processing Technology
 - Hazelnut Drying and Processing Technologies
 - Non-Destructive Techniques
 - Supercritical Extraction
- **Preservation and Packaging Group**
- **Residues and Contaminants Group**

2. NUTRITION AND FUNCTIONAL FOODS STRATEGIC BUSINESS UNIT

- **Functional Foods Group**
- **Nutrition Group**

3. FOOD MICROBIOLOGY AND BIOTECHNOLOGY STRATEGIC BUSINESS UNIT

- **Food Microbiology Group**
- **Food Biotechnology Group**
- **Molecular Biology Group**



The topics we are interested in...



A. Our Proposal Incentives

Topic Called	Food Institute Groups
KBBE.2010.2.3-03: Health-value-added food products for population groups at risk of poverty	<ul style="list-style-type: none">• FUNCTIONAL FOODS GROUP• PRESERVATION AND PACKAGING GROUP• CEREAL PROCESSING TECHNOLOGIES GROUP
KBBE.2010.3.3-01: Robust and novel biocatalysts for industrial applications	<ul style="list-style-type: none">• FOOD ENZYMOLOGY GROUP• FOOD BIOTECHNOLOGY GROUP

The topics we are interested in...



B. Topics We are Interested in to be Involved (1/2)

Topic Called	Food Institute Groups
KBBE.2010.1.2-02: Sustainable organic and low-input dairy production	NUTRITION GROUP
KBBE.2010.1.2-04: Improving European berries production, quality, nutraceutical and nutritional value (Strawberries, Currents, Blackberries, Blueberries and Raspberries)	<ul style="list-style-type: none"> • FUNCTIONAL FOODS GROUP • PRESERVATION AND PACKAGING GROUP
KBBE.2010.1.2-05: Integrated pest management in farming systems of major importance for Europe	RESIDUES AND CONTAMINANTS GROUP
KBBE.2010.1.3-01: Development of vaccines and improvement of detection systems to control helminth parasite infections of livestock and reservoirs – SICA (Latin America and/or Asia and/or African Mediterranean Partner Countries and/or African ACP)	<ul style="list-style-type: none"> • BIOTECHNOLOGY GROUP • MICROBIOLOGICAL CHARACTERISATION AND SAFETY GROUP
KBBE.2010.2.2-02: Diet and prevention of functional decline of the elderly	NUTRITION GROUP
KBBE.2010.2.3-02: Strategies for personalised nutrition	<ul style="list-style-type: none"> • NUTRITION GROUP • MOLECULAR BIOLOGY GROUP • GROUP OF CHEMICAL, PHYSICAL AND SENSORY CHARACTERISATION OF FOODS
KBBE.2010.2.4-02: Identification of the effect of processing on food contaminants	<ul style="list-style-type: none"> • CEREAL PROCESSING TECHNOLOGIES GROUP • RESIDUES AND CONTAMINANTS GROUP

The topics we are interested in...



B. Topics We are Interested in to be Involved (2/2)

Topic Called	Food Institute Groups
KBBE.2010.2.4-03: Quality and safety aspects of feed	MICROBIOLOGICAL CHARACTERISATION AND SAFETY GROUP
KBBE.2010.3.2-04: Innovative aquatic biosensors	FATS AND OILSTECHNOLOGY GROUP
KBBE.2010.3.3-02: Biotechnology for 'greening' the chemical industry – Industrial bioprocesses for fine and speciality chemicals and intermediates	FOOD BIOTECHNOLOGY GROUP
KBBE.2010.3.5-03: Approaches towards bioremediation of the Mediterranean Sea by exploring its microbial diversity – SICA (Mediterranean Partner Countries)	FOOD BIOTECHNOLOGY GROUP
KBBE.2010.3.5-04: Microbial diversity and metagenomic mining for biotechnological innovation	FOOD BIOTECHNOLOGY GROUP

Involvement of the Food Institute in previous / ongoing projects



Programme and Instrument	Acronym	Project Title	Leader	Total Budget (Euro)	Budget (Euro)	Start	Time (month)
FP6 - IP	QUALITYLOWINPUTFOOD	Improving Quality and Safety and Reduction of Cost in the European Organic and "Low Input" Food Supply Chains	Dr. Hülya Ölmez	12.444.696	215.150	01.03.2004	48
FP6 - CA	SAFEFOODERA	Food Safety-Forming a European Platform for Protecting Consumers Against Health Risks	Assoc. Prof. Dr. Güner Özay	3.740.691	30.600	01.08.2004	48
FP6 - STREP	HEATOX	Heat Generated Food Toxicans Identification, Characterisation and Risk Minimisation	Dr. Hülya Ölmez	4.199.915	176.500	01.11.2003	36
FP6 - SSA	MYCOGLOBE	Integration of Mycotoxins and Toxic Moulds in the Global System for Food safety	Assoc. Prof. Dr. Güner Özay	320.000	-	2004	36
FP6 - SSA	FOODLINK	Linking ACC and EU MS food sectors with a view to higher level of participation in the FP6 projects	Dr. Mehlika Borcaklı	200.000	15.500	15.04.2005	18
FP6 - NOE	EuroFIR	European Food Information Resource Network	Gül Biringen Löker	770.760*	53.643*	01.01.2005	60
FP6 - CRAFT	FERBEV	Improving the processing of four fermented beverages from Eastern European Countries	Dr. Mehlika Borcaklı	1.900.000	140.000	15.9.2005	24
FP6 - SSA	SAFEFOODNET	Food Safety and Hygiene Networking with new Eu Member States and Associated Candidate Countries	Dr. Mehlika Borcaklı	360.000	35.000	1.8.2006	36
FP6 – NOE	MONIQA	The Harmonisation of Analytical Methods Regarding Monitoring the Hazards for Monitoring Food Quality and Safety in the Food Supply Chain	Dr. Sena Ayyıldız	2.959359	90.099*	23.2.2007	36
FP7 – CSA (REGPOT-2007-1)	SAFETechnoPACK	Improving the Scientific and Technological Research Capacity of Food Institute on Safety and Technology of Food Packaging	Dr. Sena Ayyıldız	950.000	950.000	01.02.2008	42
FP7 – CPCSAInfra (INFRASTRUCTURES-2008-1)	EAST-NMR	Enhancing Access and Services to East European users towards an efficient and coordinated pan-European pool of NMR capacities to enable global collaborative research and boost technological advancements	Dr. Somer Bekiroğlu	4.121.399	114.099	01.02.2009	48
FP7 – LSCP (KBBE – 2007)	MYCORED	Novel Integrated Strategies for Worldwide Mycotoxin Reduction in the Food and Feed Chains	Assoc. Prof. Dr. Güner Özay	5.770.000	150.000	01.04.2009	48

Project ...



- **The possible name of the project** is “Robust Lipases for Industrial Polyester Synthesis” (ROBUSTLIPASE)
- **The aim of the project is:** Discovery of novel robust lipases from extremophiles for POLYESTER synthesis and their development to ensure optimal properties, stability and performance under industrial conditions.
- **Keywords related to the proposal:** Enzyme, Lipase, Extremophile, Polyester synthesis

Content of the Project in Brief



- **The idea behind the proposal:**
 - Polymers are widely used in our industrialized society
 - Most polymers are oil based and are manufactured in harsh conditions
 - Enzymatic synthesis of polymers is possible
 - Enzyme catalyzed polymers have mainly low MW.
 - This is related to the process conditions substrates but most on ENZYME
 - Extremophiles are a good source of diverse enzymes including LIPASES
 - Isolate LIPASES suitable for ENZYME catalysed POLYESTER synthesis
- **The project should focus on:** Lipase catalyzed polymer synthesis
- **The objectives of our proposal are:** A stable and effective lipase for polymer synthesis from a diol and a dicarboxylic acid.

Workpackage List



- **There should be workpackages like:**
 - WP1. Screening of Lipases from Extremophiles
 - WP2. Enzyme Modification
 - WP3. Preliminary polymerisation studies
 - WP4. Optimization of reaction parameters
 - WP5. Pilot scale production and characterization of final product
 - WP6. Dissemination and Exploitation Activities
 - WP7. Project Management
- **The deliverables of those workpackages can be:**
 - Lipase suitable for higher MW polymer synthesis
 - Optimal substrates for polymer synthesis
 - Optimal reaction conditions
 - Scale up

Possible Partners



- **An idea of the existing partnership:**
- **The possible partners for this project can be:**
 - From Academia- Expert in polymer science
 - From Research Institute- Expert in extremophiles enzymes
 - From industry- Enzyme manufacturer
 - Possible SMEs- Specialized in innovative polymer products