

# TECHNOLOGY OFFERS

HUNGARY

## L(-) Malic acid production technology

The malic acid is one of the hydroxy acids that are produced by aerobic organisms in the so-called citric acid cycle (Szent-Gyorgyi–Krebs cycle). As natural organic acid, L(-) malic acid exists in various fruits and vegetables, giving fresh acidic taste. It is recognized as an acidic agent which has high additional value in different foods, from the feature of non-volatility, easy-to-cook, and less hygroscopic nature. According to Fuso Chemical (the biggest world producer of DL malic acid), it is known as a result of the panel test of many times that equivalent acidity is left from malic acid of a few quantities as compared with citric acid. Because of its lower melting point, it is preferably prescribed than other food acid for candy manufacture. Malic acid's synergism with certain food ingredients and flavors makes it a versatile and flexible acid of choice to create new taste sensations and to add new twists to existing products. Malate is widely used by the pharmaceutical and food industries and has a potential to be used for production of biodegradable polymers that could replace plastics.

The new technology of the Hungarian leading biotechnology center produces only the biologically active L(-) form. This new biosynthesis process of L(-) malic acid has proved to be more efficient and cost-effective than the presently used ones. Genetically altered micro-organisms and a continuous flow-through conversion assure the efficiency of this method. The method uses genetically enhanced, immobilized, and killed micro-organisms that have highly elevated (1,000-fold) catalytic potential over the unaltered cells. This modification pushes the chemical equilibrium towards the required 98% conversion; consequently this new method enables an 80% conversion in industrial scale while the existing technologies have maximum 70% conversion capacity.

### Area of Application

- Food industry
- Chemical industry
- Pharmaceutical industry

### Advantages

This technology has some significant advantages in comparison with the traditional fermentation and chemical production. Firstly, downstream operations become cheaper by the high conversion rate and lack of bypass products. Secondly, the very intensive technology decreases the investment expenditures. Thirdly, it is an environment-friendly production, which does not have any effect on human health. There are no environmental risks or contraindications to use this technology, because the genetically modified cells are killed before use. No huge amount of wastewater, no bypass salts (e.g., NaCl, CaSO<sub>4</sub>). The bioreactors are working as enzyme reactors during the process.

### Environmental Aspects

Cleaner production

### Development Status

Laboratory Model

### Transfer Terms

Technology Licensing, Research Partnerships

### Target Countries

Worldwide

### Contact

Laser Consult Ltd (Hungary)  
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Hungary

## Virgin coconut oil

Virgin Coconut Oil (VCO) is the oil obtained from fresh, mature endosperm (kernel-meat) of the coconut by mechanical or natural means, with or without use of heat, no chemical refining, bleaching or deodorizing and maintains the natural aroma and nutrients.

### Area of Application

Many potential applications in food, health, and cosmetics sectors.

### Development Status

Pilot Plant, Commercial Prototype

### Transfer Terms

Consultancy, Technology licensing

### Sugarcane juice powder technology

A process for preparation of spray dried sugarcane juice powder/granule formulation. It is a general food product. The spray dried sugarcane juice possesses consumer acceptable qualities and commercial value.

### Area of Application

Food Processing/Preservation, Sugarcane Juice drying

### Advantages

Sugarcane juice powder is a novel substitute to replace the commercially available soft drinks that contain only sugar, artificial chemicals, colors and flavoring agents and devoid of nutrients.

### Environmental Aspects

Cleaner Production

### Development Status

Pilot plant, Commercial prototype, Fully commercialized

### Transfer Terms

Consultancy, Technical services, Technology licensing

### For the above two offers, contact

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## Novel transducer matrix and its application in biosensors

The principal objective of the present invention is to provide a process for the synthesis of nanostructured conducting polymer (NSCPs) by using structure directing agents. ● In addition, this

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invention also provides a process to develop a nanostructured conducting polymer with high electrical conductivity. Another objective of the present invention is to use the synthesized nanostructured conducting polymers as a transduction matrix for the development of biosensor. Yet another objective of the present invention is to provide a method for the development of optical biosensor by using synthesized nanostructured conducting polymers as a transduction matrix. Last, but not the least, this invention also intends to provide an optical biosensor having possible application in the testing of biological samples.

## **Area of Application**

An optical glucose biosensor has a potential application in the testing of biological samples.

## **Environmental Aspects**

Bio-degradable and environmentally friendly

## **Development Status**

Laboratory model

## **Legal Protection**

Patent

## **Transfer Terms**

Consultancy, Technical services, Technology licensing

## **Bacterial lipase and its application in food industry**

We could offer a technology to synthesize bacterial lipase that has potential applications in the food industry. Brief description of the process/product/technology developed—se to various polar and non-polar organic solvents for 2 h elucidates that the enzyme was stable to all organic solvents tested. The highest relative activity was achieved with chloroform (400%) followed by toluene (250%) and 1-The present invention provides an extracellular bacterial lipase from *Pseudomonas mendocina* M-37 (MTCC 7054) with high stability and substrate specificity. The bacteria were isolated from oil industry effluent showing high activity on olive oil. The substrate specificity of *Pseudomonas mendocina* M-37 lipase shows that the lipase was especially more active towards the synthetic triglycerides and fatty acids esters that possesses butyryl group like benzyl butyrate (1,120% relative activity), tributyrin (744%), and amyl butyrate (550%), respectively. The stability of lipase in organic solvents offers advantages for ester synthesis. Exposure of M-37 lipase to octanol (215%).

## **Area of Application**

The bacterial lipase showing high activity in organic solvents and substrate specificity for butyrate esters has possible significant applications in food industry for ester synthesis. The esterification reactions in food industry are carried out in organic solvents and uses butyrate substrates. *Pseudomonas mendocina* lipase has possible applications in synthesis of flavor and fragrance esters; for organic synthesis and modification of fats and oils.

## **Advantages**

*Pseudomonas mendocina* lipase possessing high stability in organic solvents, high substrate specificity mainly for butyrate

esters has possible significant applications in food industry for ester synthesis.

## **Environmental Aspects**

Bio-degradable and environmentally friendly

## **Development Status**

Laboratory model

## **Legal Protection**

Patent

## **Transfer Terms**

Consultancy, Technical services, Technology licensing

## **For the above two offers, contact**

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India

## **Bio-fertilizers, bio-pesticides, and vsm fungi**

Indian well-established innovative company engaged in R&D and low-cost production of bio-agricultural products offers bio-fertilizer, bio-pesticide, and vsm fungi technologies. Bio-fertilizers—Nitrogen is the main nutrient element to plant growth. More than 78% of Nitrogen is available in the atmospheric air, but it cannot be consumed by plants directly. Only bacteria can consume the atmospheric Nitrogen, convert it into Nitrate and fix it into soil. Afterwards it can be consumed by plants. Nitrogen content in chemical fertilizers such as urea is around 40%. It should be consumed by a plant within 3 hours; otherwise, it will be lost through leaching, volatilization, and N<sub>2</sub> gases into the atmosphere. Microbial biosphere adds as much as 275 million tons of Nitrogen to soil annually through biological fixation, that is more than the quantity of industrially produced fertilizers. Besides Nitrogen, Phosphate is another major element for growing of flowers, fruits, vegetables, and grains. Presently Phosphate content in chemical fertilizers consumable by plants is around 16–18% and the rest is in insoluble form which can be converted into soluble one with the help of phospho-bacteria. Thus over 50% of the remaining phosphate can be made available to the plant in this way. Vsm Fungi—Vsm is a single cell that supplies Phosphorus and micronutrients viz. Co, Mb, Cu, Fe, and Zn to the plant. It increases plants' disease and drought resistance. Vsm can be consumed by the plant through the root system only. Bio-pesticides—Continuous use of chemical pesticides results in accumulation of toxic substances in the soil. This contaminates harvest, destroys soil and ecological balance. Bio-pesticides offer alternative environment-friendly method to control pest infestation. In this case, bacteria or virus infect the spurious pest by rupturing its skin or attacking its nervous system, which ultimately kills the pest.

## **Area of Application**

Agriculture, horticulture, forestry

## **Advantages**

Bio-fertilizers: multi-strain concept; Vsm fungi: due to multi-strain concept, the use of chemical fertilizers can be reduced by 30 to

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50%, while increasing the yield by 10 to 20%. Bio-pesticides: multi-strain concept along with N.P.V. virus; Environment-friendly products, reduce use of chemicals in agriculture. Bio-fertilizers provide disease-free and healthy for consumption agro-products, increase crop production, eliminate contamination of agro-products by chemicals, help in replenishment of essential elements in soil, supplies essential growth hormones into plant body and regulates the supplies to the optimum level, increases resistance towards pathogens, help in utilization of barren waste land.

## **Development Status**

Fully commercialized

## **Technical Specifications**

Production capacity: 500 tons per annum;

Inputs required: Manpower: 12; Land/building: 3,000 sq.m./1,000 sq.m.

Raw materials: lignite, vermiculture, potatoes, water.

## **Transfer Terms**

Consultancy, Equipment supply, Turnkey

## **Target Countries**

Worldwide

## **Contact**

Mr. C.V. Rao, Managing Partner, Sneha Bio Research and Development Services. D.No. 49-10-11, Near Ramavarappadu Ring, Currency Nagar, Vijaywada 521 108, India.

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## **EcoKiln for small-scale burnt brick production**

The TARA EcoKiln is the world's most energy efficient and environment-friendly technology to produce burnt clay bricks. It is based on the vertical shaft brick technology process and uses coal and waste organic residues as a primary fuel. The EcoKiln has vertical shafts of rectangular cross section well insulated to arrest heat loss. The kiln works as a counter-current heat exchanger, with heat transfer taking place between the air moving up (continuous flow) and bricks moving down (intermittent movement). Green bricks are loaded in batches from kiln top. Bricks move down the shaft through preheating, firing and cooling zones before being unloaded from the bottom. The combustion of fuel takes place at the middle of the shaft. Combustion air enters from the bottom, gets preheated by the hot fired bricks in the lower portion of the shaft before reaching the combustion zone. They in turn preheat the green bricks in the upper portion of the shaft before exiting from the kiln through chimney.

## **Area of Application**

The TARA EcoKiln technology is used to produce burnt clay bricks. Best results are obtained from equivalent soil qualities. The technology is applicable in areas where land costs are high. The technology is suitable for all types of investment capacity

due to its scalability. However, it is most suitable for small-scale brick producers and entrepreneurs.

## **Environmental Aspects**

Cleaner production, Waste utilization, Energy efficiency

## **Development Status**

Fully commercialized

## **Technical Specifications**

The kiln is a civil structure made of brick and mortar. The shafts are lined with refractory bricks. A two-shaft kiln has a nominal dimension of 10 m x 15 m with a height of 7 m. Two chimneys per shaft

## **Transfer Terms**

Consultancy, Technical services, Technology licensing, Turnkey, Research partnerships

## **Target Countries**

Worldwide

## **Contact**

Technology Action for Rural Advancement

B-32, TARA Crescent Qutab Institutional Area

New Delhi 110016

India

## **Waste plastics into industrial fuel**

We offer plants for converting non-recyclable waste plastics into industrial fuel. Fuel quality far superior to the conventional industrial fuels such as furnace oil or light diesel oil. ALL types of plastics can be processed. We can also supply technology. Serious customers can get their waste plastics tested on our Demo Plant. Plants as small as 1 TPD of plastics up to 30 TPD can be supplied. Plants are custom-made to specific requirements. Municipal bodies, industries involved in generation of non-recyclable plastic scrap, plastic scrap dealers who have access of non-recyclable cheap plastic scrap, entrepreneurs most welcome.

## **Area of Application**

Converting waste plastics (non-recyclable cheap plastic scrap) into industrial fuel.

## **Advantages**

Disposal of non-recyclable waste plastics keeps environment clean, gets excellent monetary returns, for the industries that have their own plastic scrap generation can generate fuel at a very low price.

## **Environmental Aspects**

Cleaner production, Waste utilization, Energy efficiency, Systems integration

## **Development Status**

Pilot plant, Commercial prototype

## **Legal Protection**

Trade mark, Patent

## **Technical specifications**

Plants having capacity as low as 1 TPD of plastics offered. No upper limit on higher capacities.

**Transfer Terms**

Consultancy, Joint venture, Technology licensing, Turnkey

**Contact**

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**Solar chimney for electricity generation**

A Thai university offers solar chimney technology for electricity generation. By this technology, solar energy is converted into wind energy that is used by a turbine generating electric power.

**Area of Application**

Large scale electricity generation

**Advantages**

Cheap and clean renewable energy generation technique

**Environmental Aspects**

Energy efficiency

**Development Status**

Pilot plant

**Transfer Terms**

Consultancy, Others

**Target Countries**

Worldwide

**Contact**

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**Wind energy**

Natural Energy Co., Ltd. Innovative designed small wind turbine combined with aerodynamic design able to operate from low wind speed and able to withstand stormy wind with self-regulated design as functions of the main-blade. The rots and moving parts are constructed with light-weight aluminum. The unique vertical-axis design ensures a robust performance in the urban environment, where wind speed is lower and wind directions change frequently. Natural Energy wind turbines operate in low wind speed (3 m/s), quiet operation, unlimited high wind performance. It is the development for area with low and medium wind speed. We deliver three main models: 500 W, 1,000 W, and 2,000 W. Moreover, we also offer VT2000 which is used for water mechanical pumping.

**Area of Application**

Renewable energy industry

**TECHNOLOGY OFFERS****Advantages**

Aero dynamic design; Light aluminum material; Low wind performance-self start; Unlimited high wind performance (storm); Self-regulated; Quiet operation—Simple structure—minimized moving parts

**Environmental Aspects**

Cleaner production, Waste utilization, Energy efficiency, Systems integration

**Development Status**

Fully commercialized

**Legal Protection**

Trade mark, Patent, Copyright

**Transfer Terms**

Equipment supply, Others

**Contact**

Natural Energy Co., Ltd

17th Floor, S.P. Building 388 Phaholyothin Road Phayathai

Bangkok

Thailand

**Kitozan biofertilizer**

We are 5 years experience to produce Kitozan which we helped people to save environment and produce organic fruits and vegetable to feed people. which low cost and fast result. We had more than 3 million users in Thailand.

**Area of Application**

Biotechnology

**Advantages**

It can use with any chemical and fertilizer. It can mix with water and feed for animal. It can change bad soil to be good soil also.

**Environmental Aspects**

Cleaner production, Waste utilization, Energy efficiency, Systems integration

**Development Status**

Fully commercialized

**Legal Protection**

Trade mark, Copyright

**Transfer Terms**

Turnkey, Others

**Target Countries**

Worldwide

**Contact**

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