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VABILO NA PREDAVANJE
V OKVIRU DOKTORSKEGA ŠTUDIJA
KEMIJSKE ZNANOSTI

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z naslovom:

Thermophilic enzymes with Applications for Industrial Biotechnology

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Vljudno vabljeni!

Abstract:

Enzymes that are isolated from organisms that naturally grow at high temperatures have important applications for industrial biotechnology (1, 2). The enzymes are more robust and are also more stable in organic solvents which are often used industrially. Several of these enzymes that we have developed are already used coomercially such as a gamma lactamase used to make chiral building blocks for anti-viral HIV drugs and aminoacylases for the commercial production of optically pure L-aminoacids.

It is possible to determine the 3D structure of many of these enzymes so they can be compared with their mesophilic homologues in order to gain some basic rules that are linked to their increased thermal stability.

The uptake of using enzymes in biocatalytic sustainable processes is often directly linked to their costs and their ability to be used for several cycles of the reaction. The ability to immobilise the enzymes as cross-linked aggregates or by chemical linkage to solid supports in micro-reactors offers the advantages of working under continuous flow bringing additional benefits.

The ability to discover enzymes from 'Natures' biodiversity using new thermophilic genomes and metagenomes is an important resource (3). This allows access to the genes from the many micro-organisms that cannot be cultivated. This also has allowed the discovery of novel enzymes that have evolved using different evolutionary pressures that could not have otherwise have been discovered. This approach will be demonstrated by the discovery of novel epoxide hydrolase enzymes identified from hot environmental sources in Russia and China (4, 5).

Thermophilic archaeal genomes have be used to identify new thermostable branched chain (R) selective transaminase enzymes with applications for synthesis of chiral amines of interest to the pharmaceutical industries (6). Enzymes can be used in cascade reactions to synthesize new drug molecules. This can be carried out in 'one pot' reactions or in micro-reactors arranged in tandem to allow optimisation of flux through a synthetic pathway (7).

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