

CLAIMS

1. An enzyme, wherein said enzyme is derived from a *Deinococcus* or a related bacterium and is involved in energetic metabolism.
- 5 2. The enzyme of claim 1, which is active at a temperature of 30°C or more, preferably of 40°C or more.
3. The enzyme of claim 1 or 2, wherein said enzyme catalyses biomass modification.
- 10 4. The enzyme of claim 3, wherein said enzyme is selected from amylases, glucosidases, cellulases, xylanases, pectinases, esterases, acetyl xylan esterases, and glucuronidases.
5. The enzyme of claim 4, which comprises all or an active part, such as a mature form without signal peptide, of an amino acid sequence selected from SEQ ID NOs: 1-12, 58, 60, 62, 64, 66, 68, 70 and 72.
- 15 6. The enzyme of claim 3, wherein said enzyme is involved in biofuel production by fermentation.
7. The enzyme of claim 6, wherein said enzyme is selected from acetaldehyde dehydrogenases, alcohol dehydrogenases and pyruvate dehydrogenases.
- 20 8. The enzyme of claim 6, which comprises all or an active part of an amino acid sequence selected from SEQ ID NOs: 27-41.
9. A polypeptide comprising an amino acid sequence selected from SEQ ID NOs: 1-12, 27-41, 58, 60, 62, 64, 66, 68, 70 and 72 or a fragment thereof comprising at least 15 contiguous residues thereof.
10. A nucleic acid coding an enzyme or polypeptide of any one of claims 1 to 9.
- 25 11. A vector comprising a nucleic acid of claim 10.
12. A recombinant cell containing a nucleic acid of claim 10 or a vector of claim 11.

13. The cell of claim 12, which is a *Deinococcus* or a related bacterium.
14. The use of an enzyme, nucleic acid, vector or cell of any one of claims 1 to 13 for modifying biomass and/or producing metabolites or energy products, or for processing wood, pulp, agricultural wastes, organic wastes, beverages, detergents, resins, textiles, health products and drugs.
15. A method for modifying biomass, comprising exposing such biomass to an enzyme, nucleic acid, vector or cell of any one of claims 1 to 13.
16. A method for producing metabolites or bioenergy products, comprising exposing a carbon source to an enzyme, nucleic acid, vector or cell of any one of claims 1 to 13.
17. A co-culture of at least two distinct microorganisms, wherein at least one of said microorganisms is a *Deinococcus* bacterium and at least one of said microorganisms is a prokaryotic or eukaryotic cell, wherein said at least two microorganisms are symbiotic to each other, and wherein said at least one *Deinococcus* bacterium exhibits an enzymatic activity according to anyone of claims 1 to 8.
18. A co-culture of at least two distinct microorganisms, wherein at least one of said microorganisms is a *Deinococcus* bacterium and at least one of said microorganisms is a yeast, and wherein said at least one *Deinococcus* bacterium exhibits an enzymatic activity according to anyone of claims 1 to 8.

CLAIMS

1. An enzyme, wherein said enzyme is an amylase derived from a *Deinococcus* bacterium.
2. The enzyme of claim 1, which is active at a temperature of 30°C or more, preferably of 40°C or more.
3. The enzyme of claim 1, which comprises all or an active part of an amino acid sequence having at least 90% identity to SEQ ID NO: 3, 4, 5, 58 or 62.
4. The enzyme of claim 1, which comprises all or an active part of an amino acid sequence selected from SEQ ID NO: 3, 4, 5, 58 or 62.
5. The enzyme of claim 1, which comprises all or an active part of an amino acid sequence having at least 90% identity to SEQ ID NO : 3.
6. The enzyme of claim 1, which comprises all or an active part of the amino acid sequence set forth in SEQ ID NO: 3
7. A polypeptide comprising all or an active part of an amino acid sequence selected from SEQ ID NOs: 3, 6, 58, 64, 66, 68 and 70.
8. The enzyme or polypeptide of any one of claims 1 to 7, wherein the active part is a mature form without signal peptide.
9. A nucleic acid coding an enzyme or polypeptide of any one of claims 1 to 8.
10. A vector comprising a nucleic acid of claim 9.
11. A recombinant cell containing a nucleic acid of claim 9 or a vector of claim 10.
12. The cell of claim 11, which is a *Deinococcus* bacterium.
13. The use of an enzyme or cell of any one of claims 1 to 8, 11 and 12 for modifying biomass and/or producing metabolites or energy products, or for processing wood, pulp, agricultural wastes, organic wastes, beverages, detergents, resins, textiles, health products and drugs.

14. A method for modifying biomass, comprising exposing such biomass to an enzyme, or cell of any one of claims 1 to 8, 11 and 12.
15. A method for producing metabolites or bioenergy products, comprising exposing a carbon source to an enzyme or cell of any one of claims 1 to 8, 11 and 12.
16. A co-culture of at least two distinct microorganisms, wherein at least one of said microorganisms is a *Deinococcus* bacterium and at least one of said microorganisms is a prokaryotic or eukaryotic cell, wherein said at least two microorganisms are symbiotic to each other, and wherein said at least one *Deinococcus* bacterium exhibits an enzymatic activity according to anyone of claims 1 to 8.
17. A co-culture of at least two distinct microorganisms, wherein at least one of said microorganisms is a *Deinococcus* bacterium and at least one of said microorganisms is a yeast, and wherein said at least one *Deinococcus* bacterium exhibits an enzymatic activity according to anyone of claims 1 to 8.