Claims

1. A nucleic acid molecule comprising a first nucleotide sequence, wherein said nucleotide sequence has at least 85% sequence identity with SEQ ID NO: 12,

wherein said first nucleotide sequence encodes at least one cell wall-binding domain binding the peptidoglycan cell wall of *Staphylococcus* genera,

wherein said nucleic acid molecule has at least 85% sequence identity with SEQ ID NO: 1 without consisting of SEQ ID NO: 1, or wherein said nucleic acid molecule further comprises at least one heterologous nucleotide sequence encoding at least one lytic domain.

2. A nucleic acid molecule according to claim 1, wherein said first nucleotide sequence originates from *S. aureus* bacteriophage Φ2638a endolysin.

3. A nucleic acid molecule according to any of the claims 1 or 2, wherein said nucleic acid molecule further comprises at least one heterologous nucleotide sequence encoding at least one lytic domain, wherein said lytic domain is a second and third nucleotide sequence~~s~~, and wherein said second nucleotide sequence encodes at least one~~an~~ M23 endopeptidase domain and said third nucleotide sequences encodes at least one~~an~~ amidase domain.

4. A nucleic acid molecule according to claim 3, wherein said second and third nucleotide sequences originate from at least one gene encoding for at least one~~an~~ enzyme selected from the group consisting of *S. aureus* bacteriophage Φ2638a endolysin, *S. aureus* bacteriophage Φ11 endolysin, *S. aureus* bacteriophage ΦTwort endolysin and *S. Simulans* lysostaphin.

5. A nucleic acid molecule according to claim 4, wherein said second nucleotide sequence has at least 85% sequence identity with SEQ ID:14 or 15 and said third nucleotide sequences has at least 85% sequence identity with SEQ ID NO: 16 or 17.

6. A nucleic acid molecule according to claims 5, wherein said nucleotide molecule has at least 85% sequence identity with SEQ ID NO: 9.

7. A nucleic acid molecule according to any one of the claims 1 - 6, further comprising a fourth nucleotide sequence encoding a CHAP (cysteine, histidine-dependent amidohydrolases/peptidases) domain.

8. A nucleic acid molecule according to claim 7, wherein said fourth nucleotide sequences originates from *S. aureus* bacteriophage Φ11 or *S. aureus* bacteriophage ΦTwort endolysin.

9. A nucleic acid molecule according to claim 8, wherein said fourth nucleotide sequences has at least 85% sequence identity with SEQ ID NO: 18 or SEQ ID NO: 19.

10. A nucleic acid molecule according to any one of the claims 1 – 9 encoding at least one polypeptide which has the same or an increased lytic activity and/or the same or a decreased pH optimum as compared to *S. aureus* bacteriophage Φ2638a endolysin encoded by SEQ ID NO: 1.

11. A polypeptide encoded by a nucleic acid molecule as ~~identified~~ defined in any one of claims 1 - 10.

12. A nucleic acid construct comprising at least one nucleic acid molecule as ~~identified~~ defined in any of the claims 1 - 10.

13. An expression vector comprising at least one nucleic acid construct as defined in claim 12 operably linked to one or more control sequences, which direct the production or expression of the encoded polypeptide in at least one cell, at least one subject, or at least one cell-free expression system.

14. A cell comprising the nucleic acid construct as ~~identified~~ defined in claim 12 or the expression vector as ~~identified~~ defined in claim ~~15~~13, said cell being a microbial, prokaryotic or eukaryotic cell.

15. A method for producing, optionally purifying and optionally freeze-drying a polypeptide as defined in claim 11, said method comprising the steps of:

i) producing said polypeptide in at least one cell as ~~identified~~ defined in claim 14 comprising at least one nucleic acid construct as defined in claim 12, optionally

ii) purifying said polypeptide, and optionally

iii) freeze-drying said purified polypeptide.

16. A method for producing at least one polypeptide with an enhanced lytic activity by treating at least one polypeptide as ~~identified~~ defined in claim 11 and/or at least one polypeptide as obtainable by the method of claim 15, wherein said method comprises the steps of:

i) dialyzing said polypeptide against at least one buffer comprising at least one chelating compound,

ii) dialyzing said polypeptide against at least one divalent metal ion-containing buffer, preferably said divalent metal ion being selected form the group consisting of Co^{2+}, Cu^{2+}, Mn^{2+} and Zn^{2+}.

17. A composition comprising at least one nucleic acid molecule as ~~identified~~ defined in any one of the claims 1 – 10, at least one polypeptide as ~~identified~~ defined in claim 11 and/or as obtainable by a method as ~~identified~~ defined in claim 15 and/or 16, and/or at least one nucleic acid construct as ~~identified~~ defined in claim ~~13~~ 12 and/or at least one vector as ~~indentified~~ defined in claim 13 and/or at least one cell as ~~identified~~ defined in claim 14.

18. A composition according to claim 17, comprising one or more additional active ingredients, preferably selected from the group consisting of a bacteriophage and an antibiotic.

19. A composition according to claim 17 and/or 18 for use as a medicament.

20. Use of a composition according to claim 19 in the preparation of a medicament for the treatment of an infectious disease.

21. Use of at least one nucleic acid molecule according to any of the claims 1 - 10, at least one polypeptide according to claim 11, and/or as obtainable by a method as ~~identified~~ defined in claim 15 and/or 16, at least one nucleic acid construct according to claim 12, at least one vector as ~~indentified~~ defined in claim 13, at least one

cell as ~~identified~~ defined in claim 14 and/or at least one composition according to claim 17 and/or 18 ~~for use~~ in the manufacture of ~~as~~ an antimicrobial~~, preferably as a food additive or a disinfectant~~.

22. Use of at least one nucleic acid molecule according to any of the claims 1 - 10, at least one polypeptide according to claim 11, and/or as obtainable by a method as defined in claim 15 and/or 16, at least one nucleic acid construct according to claim 12, at least one vector as defined in claim 13, at least one cell as defined in claim 14 and/or at least one composition according to claim 17 and/or 18 as a food additive or a disinfectant.

~~22~~23. Use of at least one nucleic acid molecule according to any of the claims 1 or 2, at least one polypeptide encoded by such nucleic acid molecule, at least one nucleic acid construct and/or vector and/or cell comprising such nucleic acid construct or at least one composition comprising any of such polypeptide, nucleic acid molecule, nucleic acid, vector and/or cell for detecting at least one *Staphylococcus* in food or on at least one surface, preferably in a diagnostic application.