

Claims

1. A composition comprising a particle displaying an antigenic component, wherein said composition
5 comprises:
 - i) an antigenic component comprising a first peptide tag, and
 - ii) a moiety comprising a second peptide tag,
- 10 wherein the antigenic component and the moiety are linked via an isopeptide bond between said first and second peptide tags, and wherein the antigenic component is over 50 kDa.
2. A composition as claimed in claim 1 wherein the antigenic component is over 60 kDa, 70 kDa, 80 kDa, 90 kDa, 100 kDa, 110 kDa, 120 kDa, 130 kDa, 140 kDa, 150 kDa, 160 kDa, 170 kDa, 180 kDa,
15 190 kDa, 200 kDa, 300k Da or 400 kDa.
3. A composition as claimed in claim 1 or claim 2 wherein the antigenic component is a monomer or multimer, optionally wherein the multimer is a trimer, tetramer, pentamer, hexamer, septamer, octamer, nonamer or decamer.
- 20 4. A composition as claimed in any preceding claim wherein the moiety is a virus, bacteria, multimerisation scaffold for vaccination, a protein component which multimerises to form a virus-like particle (VLP), a viral structural protein, a multimerisation domain which forms nanoparticles, a synthetic nanoparticle or a synthetic VLP.
5. A composition as claimed in any preceding claim wherein the moiety is HBsAg.
- 25 6. A composition as claimed in any preceding claim wherein the first and second peptide tag are selected from any one of a SpyTag and SpyCatcher pair; a SnoopTag or SnoopTagJr and SnoopCatcher pair; a RrgATag, RrgATag2 or DogTag and RrgACatcher pair, an IsopepTag Pilin-C pair; an IsopepTag-N and Pilin-N pair; a PsCsTag and PsCsCatcher pair; and SnoopTagJr and DogTag pair mediated by SnoopLigase; or variants, derivatives or modifications thereof, optionally wherein the
30 first and second peptide tags are a SpyTag/SpyCatcher pair.
7. A composition as claimed in any preceding claim wherein the antigenic component comprises an immunogenic component of an HCMV pentamer.
8. A composition as claimed in claim 7 wherein the immunogenic component of an HCMV pentamer comprises one or more of the gH, gL, pUL128, pUL130 or pUL131 subunits.
- 35 9. A composition as claimed in claim 8 wherein the immunogenic component of an HCMV pentamer comprises all of the gH, gL, pUL128, pUL130 and pUL131 subunits.
10. A composition as claimed in any of claim 7 to claim 9 wherein the immunogenic component of an HCMV pentamer comprises a gH subunit with a truncated transmembrane domain.

11. A composition as claimed in any of claim 8 to claim 10 wherein the gH, gL, pUL128, pUL130 and pUL131 subunits have the amino acid sequences set out in SEQ ID NOs: 28, 31, 35, 33 and 36, respectively, or functional equivalents thereof.
12. A composition as claimed in any of claim 8 to claim 11 wherein the first peptide tag is attached to the gH subunit, preferably to the C-terminus of the gH subunit.
13. A composition as claimed in any one of claim 1 to claim 6 wherein the antigenic component comprises an immunogenic component of an RSV-F protein.
14. A composition as claimed in claim 13 wherein the immunogenic component of an RSV-F protein is a pre-fusion F protein, optionally a stabilised pre-fusion F protein.
15. A composition as claimed in claim 14 wherein the immunogenic component of an RSV pre-fusion F protein comprises a trimer of F₁ and F₂ subunits.
16. A composition as claimed in claim 13 to 15 wherein said RSV-F protein has the sequence set out in any one of SEQ ID Nos: 50 to 58.
17. A composition as claimed in claims 13 to 16 wherein the first peptide tag is attached to the C-terminus of the pre-fusion F protein.
18. A composition as claimed in any preceding claim wherein the first peptide tag is a SpyTag.
19. A composition as claimed in claim 18 wherein SpyTag has the amino acid sequence set out in SEQ ID NO: 30.
20. A composition as claimed in claim 18 or claim 19 wherein a SpyTag is attached via a linker.
21. A composition as claimed in claim 20 wherein the linker has the amino acid sequence set out in SEQ ID NO: 29.
22. A composition as claimed in any preceding claim wherein the moiety is HBsAg, and optionally wherein the second peptide tag is a SpyCatcher.
23. A composition as claimed in claim 22 wherein the second peptide is a SpyCatcher, said SpyCatcher has the amino acid sequence set out in SEQ ID NO: 38.
24. A composition as claimed in claim 22 or claim 23 wherein the moiety is attached to the SpyCatcher through a linker, preferably a flexible linker.
25. A composition as claimed in claim 24 wherein the linker has the amino acid sequence set out in SEQ ID NO: 39.
26. A composition as claimed in any preceding claim wherein the composition is an immunogenic or vaccine composition.
27. A vaccine comprising a composition as claimed in any of claims 1 to 26 for use in the prophylaxis and/or treatment of a disease.

28. A method of producing a composition in accordance with any of claims 1 to 26, said method comprising:
- introducing a first nucleic acid which encodes a first genetic fusion of a first protein to a first peptide tag into a first host cell;
 - 5 - incubating said first host cell under conditions for expressing said first genetic fusion;
 - introducing a second nucleic acid which encodes a second genetic fusion of a second protein to a second peptide tag into a second host cell;
 - incubating said second host cell under conditions for expressing said second genetic fusion;
 - optionally purifying the expressed components;
 - 10 - incubating the expressed components under conditions for formation of an isopeptide bond between the first peptide tag and the second peptide tag; and optionally purifying the resultant composition.
29. A method as claimed in claim 28 wherein the first protein comprises an antigenic component and the second protein comprises a moiety.
30. A nucleic acid molecule for use in a method as claimed in claim 28 or claim 29 wherein the nucleic molecule encodes an amino sequence as set out in any of SEQ ID NOs: 27 to 41.
31. A nucleic acid molecule as claimed in claim 30 having a nucleotide sequence as set out in any of SEQ ID NOs: 12 to 26 or 42 to 46.
32. A nucleic acid molecule for use in a method as claimed in claim 28 or claim 29 wherein the nucleic molecule encodes an amino sequence as set out in any of SEQ ID NOs: 50 to 58.
33. A nucleic acid molecule as claimed in claim 32 having a nucleotide sequence as set out in any of SEQ ID NOs: 47 to 55.
34. A vector comprising a nucleic acid molecule as claimed in claim 30 to 33.
35. A host cell comprising a nucleic acid molecule as claimed in claim 30 to 32, or a vector as claimed in claim 34.
36. A kit comprising a composition comprising a first immunogenic composition and optionally one or more booster composition(s) comprising a second immunogenic composition wherein said first and/or second immunogenic compositions comprise a composition as claimed in any of claim 1 to claim 26.
37. A vaccine for use in the prophylaxis and/or treatment of HCMV infection comprising a composition as claimed in any of claims 7 to 12.
38. A vaccine for use in the prophylaxis and/or treatment of RSV infection comprising a composition as claimed in any of claims 13 to 17.