WHAT IS CLAIMED IS:

1. A chimeric molecule comprising a fusion polypeptide having the formula M-L1-FCS-FL- functional PE domain III, wherein

M is an antibody which specifically binds to mesothelin, or a fragment thereof that specifically binds mesothelin;

L1 consists of from 1 to 10 continuous amino acid residues;

FCS is a furin cleavage site consisting of continuous amino acid residues capable of being cleaved by furin;

FL consists of from 3 to 8 continuous amino acid residues selected independently from glycine and serine;

Functional PE domain III consists of continuous amino acid residues identical in sequence to SEQ ID NO:1 from position 395 to 613, optionally comprising (i) substitutions in one or more residues corresponding to 609-613 of SEQ ID NO:1, (ii) a substitution of glycine, alanine, valine, leucine, or isoleucine for arginine at a position corresponding to position 490 of SEQ ID NO:1, (iii) a substitution of one or more residues corresponding to residues of SEQ ID NO:1, which residues of SEQ ID NO:1 maintain immunogenicity of aan epitope or subepitope of PE domain III, or (iv) a combination of any of (i)-(iii).

2. The molecule of claim 1, wherein the antibody is a minibody, a diabody, a triabody, an Fab' fragment, an $F(ab)'_2$ fragment, a single chain Fv proteins ("scFv"), or a disulfide stabilized Fv protein ("dsFv") fragment.

3. The molecule of claim 1, wherein the antibody fragment comprises disulfide stabilized light and heavy chain immunoglobulin variable regions fused to the remainder of the molecule through linkage of the heavy chain to L1.

4. The molecule of claim 1, wherein the antibody comprises:

a V_H chain comprising a CDR1 amino acid sequence of GYTMN (SEQ ID NO:51), a CDR2 amino acid sequence of LITPYNGASSYNQKFRG (SEQ ID NO:52), and a CDR3 amino acid sequence of GGYDGRGFDY (SEQ ID NO:53), and

a V_L chain comprising a CDR1 amino acid sequence of SASSSVSYMH (SEQ ID NO:54), a CDR2 amino acid sequence of DTSKLAS (SEQ ID NO:55), and a CDR3 amino acid sequence selected from the group consisting of QQWSGYPLT (SEQ ID NO:56), QQWSKHPLT (SEQ ID NO:57), QQWSGHPLT (SEQ ID NO:58), QQWSAHPLT (SEQ ID

NO:59), QQWSQIPLT (SEQ ID NO:60), QQWGFNPLT (SEQ ID NO:61), QQWGTNPLT (SEQ ID NO:62), QQWGSHPLT (SEQ ID NO:63), QQWGDFPLT (SEQ ID NO:64), QQWGDHPLT (SEQ ID NO:65), QQWSAHPLT (SEQ ID NO:66), and QQWSGYPTT (SEQ ID NO:67).

5. The molecule of claim 4, wherein the V_L CDR3 amino acid sequence is QQWSKHPLT (SEQ ID NO:57).

6. The molecule of claim 1, wherein L1 is 3 to 5 amino acids in length.

7. The molecule of claim 1, wherein L1 is ASGG (SEQ ID NO:19).

8. The molecule of claim 1, wherein the PE domain III has a substitution of alanine, glycine or serine of at least one amino acid residue corresponding to an amino acid residue of SEQ ID NO:1 selected from the group consisting of D403, R412, R427, E431, R458, D461, R505, E522, R538, R551, R576 and L597.

9. The molecule of claim 1, wherein the PE domain III has a substitution of alanine, glycine or serine of at least one amino acid residue corresponding to an amino acid residue of SEQ ID NO:1 selected from the group consisting of D406, R432, R467, R490, R513, E548, K590 and Q592.

10. The molecule of claim 1, wherein the FL is GGS, $(GGS)_2$ (SEQ ID NO:18), GSGG (SEQ ID NO:71), GGSGG (SEQ ID NO:72), GGSG (SEQ ID NO:73), GSG, or GGG.

11. The molecule of claim 1, wherein FL is GGS.

12. The molecule of claim 1, wherein the furin cleavage sequence is RHRQPRGWEQL (SEQ ID NO:17).

13. The molecule of claim 1, wherein the PE functional Domain III is the PE functional domain Domain III of LR having the amino acid sequence of SEQ ID NO:4 from position 20 to 237 or of SEQ ID NO:5 from position 20 to 237.

14. The molecule of claim 1, wherein the ~~targeting moiety~~antibody comprises a disulfide stabilized SS1 variable light chain of SEQ ID NO: 6 and SS1 variable heavy chain of sequence of SEQ ID NO:7.

15. The molecule of claim 1, wherein the molecule comprises the SS1 variable light chain of SEQ ID NO: 6 and the SS1 variable heavy chain-PE fusion polypeptide of SEQ ID NO:8 wherein the variable light and heavy chains form a disulfide stabilized antibody.

16. The molecule of any one of ~~the above claims~~claims 1-15, wherein the FCS is identical in sequence to SEQ ID NO:1 from position 274 to 284 or ~~of~~ is the amino acid sequence RHRSKRGWEQL (SEQ ID NO:29)~~;~~.

17. A pharmaceutical composition comprising the molecule of any one of claims 1 to 16 and a pharmaceutically acceptable excipient.

18. A nucleic acid encoding ~~a~~the molecule of any one of claims 1 to 16.

19. A vector comprising the nucleic acid of claim 18.

20. ~~The~~ A host cell comprising the nucleic acid of claim 18.

21. ~~A method of treating a cancer which overexpresses mesothelin in a subject in need thereof, comprising administration of a~~Use of the chimeric molecule of any one of claims 1 to 16 ~~to the subject~~in the manufacture of a medicament for treating a cancer which overexpresses mesothelin in a subject in need thereof.

22. The ~~method~~ use of claim 21, wherein the cancer is a lung adenocarcinoma, an ovarian carcinoma, mesothelioma ~~or and~~and/or epidermoid carcinoma.

23. A fusion polypeptide having the formula FCS-FL-PE functional Domain III, wherein:

FCS consists of continuous amino acid residues identical in sequence to SEQ ID NO:1 from position 274 to 284 or of the amino acid sequence RHRSKRGWEQL (SEQ ID NO:17);

FL consists of from 3 to 8 continuous amino acid residues selected independently from glycine and serine;

PE functional domain III consists of continuous amino acid residues identical in sequence to SEQ ID NO:1 from position 395 to 613, optionally comprising (i) substitutions in one or more residues corresponding to 609-613 of SEQ ID NO:1, (ii) a substitution of glycine, alanine, valine, leucine, or isoleucine for arginine at a position corresponding to position 490 of SEQ ID NO:1, (iii) a substitution of one or more residues corresponding to residues of SEQ ID

NO:1, which residues of SEQ ID NO:1 maintain immunogenicity of a epitope or subepitope of PE domain III, or (iv) a combination of any of (i)-(iii).

24. A nucleic acid encoding the polypeptide of claim ~~19~~23.