

What is claimed is:

1. An anti-CD138 antibody molecule, which:

(i) binds, or substantially binds, to CD138 in an extracellular region proximal to the transmembrane domain of CD138; and  
(ii) causes an antibody-dependent cellular cytotoxicity (ADCC) activity on a cell expressing CD138.

2. The antibody molecule of claim 1, wherein the antibody molecule has one, two, three, four, five, or all of (i)-(vi):

(i) the C-terminus of the extracellular region proximal to the transmembrane domain is within 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

(ii) the N-terminus of the extracellular region proximal to the transmembrane domain is within 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

(iii) the antibody molecule binds to an epitope on CD138 comprising five or more (*e.g.*, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, or more) consecutive amino acid residues in the extracellular region;

(iv) the extracellular region proximal to the transmembrane domain comprises, or consists of, amino acids 210-250 or 220-245 of any of SEQ ID NOS: 1-3 or 450;

(v) the antibody molecule binds to an Fc receptor (FcR) (*e.g.*, one or more of FcγRI, FcγRIIa, FcγRIIb, FcγRIIc, FcγRIIIa, or FcγRIIIb) on the surface of an immune cell (*e.g.*, a natural killer (NK) cell, a macrophage, a monocyte, or an eosinophil); and/or

(vi) the cell expressing CD138 is a cancer cell or precancerous cell, optionally wherein the cancer or precancerous cell is a myeloma cell.

3. The antibody molecule of claim 1 or 2, which has one, two, or all of (i)-(iii):

(i) (a) does not bind, or binds with low affinity, to an extracellular region of CD138 distant from the transmembrane domain; or

(b) binds, or substantially binds, an epitope on CD138 comprising five or more (*e.g.*, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, or more) consecutive amino acid residues in an extracellular region distant from the transmembrane domain;

(ii) does not bind to an epitope on CD138 comprising five or more (*e.g.*, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, or more) consecutive amino acid residues in an extracellular region distant from the transmembrane domain;

optionally wherein:

5 (a) the C-terminus of the extracellular region distant from the transmembrane domain is at least 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, or 200 amino acids away from the N-terminus of the transmembrane domain; and/or

(b) the extracellular region distant from the transmembrane domain comprises amino acids 23-50, 51-95, 88-121, or 111-150 of any of SEQ ID NOS: 1-3 or 450; and/or

10 (iii) (a) does not bind, or binds with low affinity, to the integrin binding domain (IBD) of CD138, a region N-terminal to the IBD of CD138, or both; or (b) binds to the IBD of CD138, a region N-terminal to the IBD of CD138, or both.

15 4. The antibody molecule of any of claims 1-3, which has one, two, three, four, five, six, seven, eight, nine, or all of (i)-(x):

(i) binds to CD138 with a disassociation constant ( $K_D$ ) of less than about 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, 8, 6, 4, 3, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.01, 0.005, or 0.001 nM, or about 10-0.001, 10-0.01, 5-0.01, 3-0.05, or 1-0.1 nM;

20 (ii) the binding affinity of the antibody molecule to a membrane-bound CD138 is at least 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 50, 100, 200, or 500-fold higher than the binding affinity to a soluble CD138;

(iii) binds to a membrane-bound CD138 with a  $K_D$  less than about 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, 8, 6, 4, 3, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.01, 0.005, or 0.001 nM, or about 10-0.001, 10-0.01, 5-0.01, 3-0.05, or 1-0.1 nM;

25 (iv) binds to a soluble CD138 with a  $K_D$  less than about 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, 8, 6, 4, 3, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.01, 0.005, or 0.001 nM, or about 10-0.001, 10-0.01, 5-0.01, 3-0.05, or 1-0.1 nM, or with a  $K_D$  of more than about 100, 200, 300, 400, or 500 nM;

(v) binds to a membrane-bound CD138 preferably over a soluble CD138, *e.g.*, the binding affinity to a membrane-bound CD138 is at least 2, 3, 4, 5, 6, 7, 8, 9, or 10-fold higher than the binding affinity to a soluble CD138; or binds with similar affinity to a membrane-bound CD138 and a soluble CD138, *e.g.*, the binding affinity to a membrane-bound CD138 is less than about 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, or 100% higher than the binding affinity to a soluble CD138;

30 (vi) binds to C1q and causes a complement-dependent cytotoxicity (CDC) activity on a cell expressing CD138;

(vii) reduces (*e.g.*, inhibits, blocks, or neutralizes) one or more biological activities of a cell expressing CD138 *in vitro*, *ex vivo*, or *in vivo*;

(viii) mediates homotypic adhesion of one or more CD138-expressing cells;

(ix) inhibits the action of a protease on a membrane-bound CD138, *e.g.*, to reduce shedding of

5 CD138; and/or

(x) reduces (*e.g.*, inhibits) proliferation of a cancer or precancerous cell expressing CD138.

10 5. The antibody molecule of any of claims 1-4, comprising:

(i) one or more (*e.g.*, two or three) heavy chain CDRs and/or one or more (*e.g.*, two or three) light chain CDRs of an anti-CD138 monoclonal antibody described herein;

(ii) a heavy chain variable region (VH) and/or light chain variable region (VL) of an anti-CD138 monoclonal antibody described herein; and/or

15 (iii) an Fc region.

6. An anti-CD138 antibody molecule, which binds, or substantially binds, to an epitope on CD138 comprising four or more (*e.g.*, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, or more) consecutive amino acid residues in an extracellular region proximal to the transmembrane domain of CD138.

20

7. The antibody molecule of claim 6, wherein the antibody molecule has one, two, three, or all of (i)-(iv):

(i) the C-terminus of the extracellular region proximal to the transmembrane domain is within 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

25

(ii) the N-terminus of the extracellular region proximal to the transmembrane domain is within 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

(iii) the extracellular region proximal to the transmembrane domain comprises, or consists of, amino acids 176-250 of any of SEQ ID NOS: 1-3 or 450; and/or

30

(iv) the antibody molecule does not bind, or binds with low affinity, to an extracellular region of CD138 distant from the transmembrane domain; and/or the epitope does not comprise five or more (*e.g.*,

6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, or more) consecutive amino acid residues in an extracellular region distant from the transmembrane domain;

optionally wherein:

(a) the C-terminus of the extracellular region distant from the transmembrane domain is at least 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, or 200 amino acids away from the N-terminus of the transmembrane domain;

(b) the extracellular region distant from the transmembrane domain comprises amino acids 23-50, 51-95, 88-121, or 111-150 of any of SEQ ID NOS: 1-3 or 450; and/or

(c) the antibody molecule (1) does not bind, or binds with low affinity, to the integrin binding domain (IBD) of CD138, a region N-terminal to the IBD of CD138, or both, or (2) binds to the IBD of CD138, a region N-terminal to the IBD of CD138, or both.

8. An anti-CD138 antibody molecule, which binds, or substantially binds, to an epitope on CD138 comprising four or more (*e.g.*, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, or more) consecutive amino acid residues in an extracellular region distant to the transmembrane domain of CD138, wherein the epitope does not consist of amino acid residues 107-111 of any of SEQ ID NOS: 1-3 or 450.

9. The antibody molecule of claim 8, wherein:

(i) the epitope does not comprise amino acids 107-111 of any of SEQ ID NOS: 1-3 or 450

(ii) the C-terminus of the extracellular region distant from the transmembrane domain is at least 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, or 200 amino acids away from the N-terminus of the transmembrane domain;

(iii) the extracellular region distant to the transmembrane domain comprises, or consists of, amino acids 88-121 of any of SEQ ID NOS: 1-3 or 450.

10. An anti-CD138 antibody molecule, which binds, or substantially binds, to an epitope on CD138 comprising four or more (*e.g.*, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, or more) consecutive amino acid residues in an extracellular region proximal to the transmembrane domain of CD138; and four or more (*e.g.*, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30,

35, 40, 45, 50, 55, 60, 65, 70, 75, or more) consecutive amino acid residues in an extracellular region distant to the transmembrane domain of CD138.

11. The antibody molecule of claim 10, wherein the antibody molecule has one, two, three, four,  
5 five, six, seven, or all of (i)-(viii):

(i) the C-terminus of the extracellular region proximal to the transmembrane domain is within 70,  
65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

(ii) the N-terminus of the extracellular region proximal to the transmembrane domain is within  
10 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

(iii) the extracellular region proximal to the transmembrane domain comprises, or consists of, amino acids 176-250 or amino acids 210-250 of any of SEQ ID NOS: 1-3 or 450;

(iv) the C-terminus of the extracellular region distant from the transmembrane domain is at least  
15 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, or 200 amino acids away from the N-terminus of the transmembrane domain;

(v) the extracellular region distant from the transmembrane domain comprises, or consists of, amino acids 23-50, 51-95, 88-121, or 111-150 of any of SEQ ID NOS: 1-3 or 450;

(vi) the extracellular region distant to the transmembrane domain comprises, or consists of, amino  
20 acids 88-121 of any of SEQ ID NOS: 1-3 or 450;

(vii) (a) does not bind, or binds with low affinity, to the integrin binding domain (IBD) of CD138; or (b) binds to the IBD of CD138, optionally wherein the epitope comprises amino acids 107-111 of any of SEQ ID NOS: 1-3 or 450; and/or

(viii) does not bind, or binds with low affinity, to a region N-terminal to the IBD of CD138,  
25 optionally wherein the epitope does not comprise amino acids 107-111 of any of SEQ ID NOS: 1-3 or 450(ii) the N-terminus of the extracellular region proximal to the transmembrane domain is within 75, 70, 65, 60, 55, 50, 45, 40, 35, 30, 25, 20, 15, 10, or 5 amino acids from the N-terminus of the transmembrane domain;

(iii) the extracellular region proximal to the transmembrane domain comprises, or consists of,  
30 amino acids 176-250 or amino acids 210-250 of any of SEQ ID NOS: 1-3 or 450;

(iv) the C-terminus of the extracellular region distant from the transmembrane domain is at least 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, or 200 amino acids away from the N-terminus of the transmembrane domain;

(v) the extracellular region distant from the transmembrane domain comprises, or consists of, amino acids 23-50, 51-95, 88-121, or 111-150 of any of SEQ ID NOS: 1-3 or 450;

(vi) the extracellular region distant to the transmembrane domain comprises, or consists of, amino acids 88-121 of any of SEQ ID NOS: 1-3 or 450;

5 (vii) (a) does not bind, or binds with low affinity, to the integrin binding domain (IBD) of CD138; or (b) binds to the IBD of CD138, optionally wherein the epitope comprises amino acids 107-111 of any of SEQ ID NOS: 1-3 or 450; and/or

(viii) does not bind, or binds with low affinity, to a region N-terminal to the IBD of CD138, optionally wherein the epitope does not comprise amino acids 107-111 of any of SEQ ID NOS: 1-3 or  
10 450.

12. The antibody molecule of any of claims 6-11, which:

15 (i) binds to an Fc receptor (FcR) (*e.g.*, one or more of FcγRI, FcγRIIa, FcγRIIb, FcγRIIc, FcγRIIIa, or FcγRIIIb) on the surface of an immune cell (*e.g.*, a natural killer (NK) cell, a macrophage, a monocyte, or an eosinophil);

(ii) is capable of causing an ADCC activity on a cell expressing CD138, optionally wherein the cell expressing CD138 is a cancer cell or precancerous cell, further optionally wherein the cancer or  
20 precancerous cell is a myeloma cell;

(iii) binds to CD138 with a disassociation constant ( $K_D$ ) of less than about 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, 8, 6, 4, 3, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.01, 0.005, or 0.001 nM, or about 10-0.001, 10-0.01, 5-0.01, 3-0.05, or 1-0.1 nM;

(iv) has a binding affinity to a membrane-bound CD138 at least 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 50,  
25 100, 200, or 500-fold higher than the binding affinity to a soluble CD138; or which binds with similar affinity to a membrane-bound CD138 and a soluble CD138, *e.g.*, the binding affinity to a membrane-bound CD138 is less than about 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, or 100% higher than the binding affinity to a soluble CD138;

(v) binds to a membrane-bound CD138 with a  $K_D$  less than about 100, 90, 80, 70, 60, 50, 40, 30,  
30 20, 10, 8, 6, 4, 3, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.01, 0.005, or 0.001 nM, or about 10-0.001, 10-0.01, 5-0.01, 3-0.05, or 1-0.1 nM;

(vi) binds to a soluble CD138 with a  $K_D$  of less than about 100, 90, 80, 70, 60, 50, 40, 30, 20, 10, 8, 6, 4, 3, 2, 1, 0.5, 0.2, 0.1, 0.05, 0.01, 0.005, or 0.001 nM, or about 10-0.001, 10-0.01, 5-0.01, 3-0.05, or 1-0.1 nM, or greater than about 100, 200, 300, 400, or 500 nM;

(vii) (a) binds to a membrane-bound CD138 preferably over a soluble CD138, *e.g.*, the binding affinity to a membrane-bound CD138 is at least 2, 3, 4, 5, 6, 7, 8, 9, or 10-fold higher than the binding affinity to a soluble CD138; or (b) binds to C1q and causes a complement-dependent cytotoxicity (CDC) activity on a cell expressing CD138;

(viii) reduces (*e.g.*, inhibits, blocks, or neutralizes) one or more biological activities of a cell expressing CD138 *in vitro*, *ex vivo*, or *in vivo*;

(ix) mediates homotypic adhesion of one or more CD138-expressing cells;

(x) inhibits the action of a protease on a membrane-bound CD138, *e.g.*, to reduce shedding of CD138;

(xi) reduces (*e.g.*, inhibits) proliferation of a cancer or precancerous cell expressing CD138;

(xii) comprises one or more (*e.g.*, two or three) heavy chain CDRs and/or one or more (*e.g.*, two or three) light chain CDRs of an anti-CD138 monoclonal antibody described herein;

(xiii) comprises a heavy chain variable region (VH) and/or light chain variable region (VL) of an anti-CD138 monoclonal antibody described herein; and/or

(xiv) comprises an Fc region.

13. An anti-CD138 antibody molecule comprising one or both of:

(a) a heavy chain variable region (VH), wherein the VH comprises three heavy chain complementarity determining regions (HCDR1, HCDR2, and HCDR3), wherein the VH comprises one, two, or all of the following:

(i) an HCDR1 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the HCDR1 of an anti-CD138 monoclonal antibody described herein (*e.g.*, any of antibodies CD001, CD002, CD003, CD004, CD005, CD006, 602, 603, 604, 607, 613, 614, 617, 624, 632, 616, 619, 623, 1610, 2510, 2610, 2710, 2810, 2910, or 1409);

(ii) an HCDR2 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the HCDR2 of the anti-CD138 antibody; or

(iii) an HCDR3 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the HCDR3 of the anti-CD138 antibody; or

(b) a light chain variable region (VL), wherein the VL comprises three light chain complementarity determining regions (LCDR1, LCDR2, and LCDR3), wherein the VL comprises one, two, or all of the following:

(i) an LCDR1 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the LCDR1 of the anti-CD138 antibody;

(ii) an LCDR2 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the LCDR2 of the anti-CD138 antibody; or

(iii) an LCDR3 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the LCDR3 of the anti-CD138 antibody.

14. The antibody molecule of claim 13, wherein the antibody molecule has one, two, or all of (I), (II) or both (I) and (II):

(I) wherein the antibody molecule has (a), (b) or both (a) and (b):

(a) the VH comprises:

(i) an HCDR1 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the HCDR1 of the anti-CD138 antibody;

(ii) an HCDR2 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the HCDR2 of the anti-CD138 antibody; and

(iii) an HCDR3 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the HCDR3 of the anti-CD138 antibody;

optionally wherein the VH comprises: (i) an HCDR1 comprising the amino acid sequence of the HCDR1 of the anti-CD138 antibody; (ii) an HCDR2 comprising the amino acid sequence of the HCDR2 of the anti-CD138 antibody; and (iii) an HCDR3 comprising the amino acid sequence of the HCDR3 of the anti-CD138 antibody; or

(b) the VL comprises:

(i) an LCDR1 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the LCDR1 of the anti-CD138 antibody;

(ii) an LCDR2 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the LCDR2 of the anti-CD138 antibody; and

(iii) an LCDR3 comprising an amino acid sequence that differs by no more than 1, 2, or 3 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the LCDR3 of the anti-CD138 antibody;

optionally wherein the VL comprises: (i) an LCDR1 comprising the amino acid sequence of the LCDR1 of the anti-CD138 antibody; (ii) an LCDR2 comprising the amino acid sequence of the LCDR2 of the anti-CD138 antibody; and (iii) an LCDR3 comprising the amino acid sequence of the LCDR3 of the anti-CD138 antibody;

(II) wherein the antibody molecule has (a), (b), or both (a) and (b):

(a) the VH comprises an amino acid sequence that differs by no more than 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the VH of the anti-CD138 antibody;

optionally wherein the VH comprises the amino acid sequence of the VH of the anti-CD138 antibody; or

(b) the VL comprises an amino acid sequence that differs by no more than 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, or 15 amino acid residues from, or has at least 85, 90, 95, 99 or 100% homology with, the amino acid sequence of the VL of the anti-CD138 antibody;

optionally wherein the VL comprises the amino acid sequence of the VL of the anti-CD138 antibody; and/or

(III) the antibody molecule comprises an Fc region.

15. An anti-CD138 antibody molecule comprising:

(I) (a) a heavy chain variable region (VH), wherein the VH comprises three heavy chain complementarity determining regions (HCDR1, HCDR2, and HCDR3), wherein the VH comprises three heavy chain complementarity determining regions (HCDR1, HCDR2, and HCDR3), wherein the VH comprises: (i) an HCDR1 comprising an amino acid sequence of G-Y-N/S/T-F-S-S-Y (SEQ ID NO: 438); (ii) an HCDR2 comprising an amino acid sequence of H-P-S-D-S-T (SEQ ID NO: 351); or (iii) an HCDR3 comprising an amino acid sequence of F-V-Y; and (b) a light chain variable region (VL), wherein the VL comprises three light chain complementarity determining regions (LCDR1, LCDR2, and LCDR3), wherein the VL comprises one, two, or all of: (i) an LCDR1 comprising an amino acid sequence of R-S-S-K-S-L-L-Y-K-D-G-K-T-Y-L-N (SEQ ID NO: 352); (ii) an LCDR2 comprising an amino acid

sequence of V-V-S-T-R-A-S (SEQ ID NO: 353); or (iii) an LCDR3 comprising an amino acid sequence of Q-Q-L-V-E-Y-P-Y-T (SEQ ID NO: 354); or

(II) (a) a heavy chain variable region (VH), wherein the VH comprises three heavy chain complementarity determining regions (HCDR1, HCDR2, and HCDR3), wherein the VH comprises three heavy chain complementarity determining regions (HCDR1, HCDR2, and HCDR3), wherein the VH comprises: (i) an HCDR1 comprising an amino acid sequence of S-Y-Y-M-H (SEQ ID NO: 380); (ii) an HCDR2 comprising an amino acid sequence of T-I-H-P-S-D-S-T-T-N-C/Y-N-Q-K-F-K-G (SEQ ID NO: 439); or (iii) an HCDR3 comprising an amino acid sequence of F-V-Y; and (b) a light chain variable region (VL), wherein the VL comprises three light chain complementarity determining regions (LCDR1, LCDR2, and LCDR3), wherein the VL comprises one, two, or all of: (i) an LCDR1 comprising an amino acid sequence of R-S-S-K-S-L-L-Y-K-D-G-K-T-Y-L-N (SEQ ID NO: 352); (ii) an LCDR2 comprising an amino acid sequence of V-V-S-T-R-A-S (SEQ ID NO: 353); or (iii) an LCDR3 comprising an amino acid sequence of Q-Q-L-V-E-Y-P-Y-T (SEQ ID NO: 354).

16. The antibody molecule of any of claims 1-15, which has one, two, three, four, five, six, seven, eight, nine, or all of (i)-(x):

(i) comprises two VHs and two VLs;

(ii) is a synthetic antibody molecule or an isolated antibody molecule;

(iii) is a monovalent antibody molecule, a multivalent (*e.g.*, bivalent, trivalent, or tetravalent) antibody molecule, a monospecific molecule, or a multispecific (*e.g.*, bispecific, trispecific, or tetraspecific) antibody molecule;

(iv) is a humanized antibody molecule;

(v) comprises one or more framework regions derived from human framework germline sequence;

(vi) is an IgG antibody;

(vii) comprises a heavy chain constant region of IgG chosen from IgG1, IgG2, IgG3, or IgG4;

(viii) comprises a light chain constant region of kappa or lambda light chain;

(ix) comprises an Fc region comprising one or more mutations to increase the binding affinity to neonatal receptor FcRn and/or the half-life of the antibody molecule; and/or

(x) comprises an Fc region comprising one or more mutations described herein, *e.g.*, to increase one or more of half-life, ADCC, CDC, or ADCP.

17. An antibody molecule, which competes for binding to CD138 with an anti-CD138 monoclonal antibody described herein (*e.g.*, any of antibodies CD001, CD002, CD003, CD004, CD005, CD006, 602, 603, 604, 607, 613, 614, 617, 624, 632, 616, 619, 623, 1610, 2510, 2610, 2710, 2810, 2910, or 1409).

5

18. An antibody molecule, which binds, or substantially binds, to an epitope that completely or partially overlaps with the epitope of an anti-CD138 monoclonal antibody described herein (*e.g.*, any of antibodies CD001, CD002, CD003, CD004, CD005, CD006, 602, 603, 604, 607, 613, 614, 617, 624, 632, 616, 619, 623, 1610, 2510, 2610, 2710, 2810, 2910, or 1409).

10

19. An antibody-molecule drug conjugate (ADC) comprising an antibody molecule of any of claims 1-18, optionally comprising a cytotoxic agent, further optionally comprising a linker.

20. A composition comprising an antibody molecule of any of claims 1-18, or an ADC of claim 19, optionally, wherein the composition is a pharmaceutical composition; optionally wherein the composition further comprises a pharmaceutically acceptable carrier.

15

21. A nucleic acid molecule encoding a heavy chain variable region (VH), a light chain variable region (VL), or both, of an antibody molecule of any of claims 1-18.

20

22. A vector comprising a nucleic acid molecule of claim 21.

23. A cell comprising a nucleic acid molecule of claim 21 or a vector of claim 22, optionally, wherein the cell is an isolated cell.

25

24. A kit comprising an antibody molecule of any of claims 1-18, an ADC of claim 19, or a composition of claim 20, and instructions for use of the antibody molecule or composition.

25. A container comprising an antibody molecule of any of claims 1-99, an ADC of claim 100, or a composition of claim 101 or 102.

30

26. A method of producing an anti-CD138 antibody molecule, the method comprising culturing a cell of claim 23 under conditions that allow production of an antibody molecule, thereby producing the

antibody molecule; optionally wherein the method further comprises isolating or purifying the antibody molecule.

5

27. Use of an antibody molecule of any of claims 1-18, an ADC of claim 19, or a composition of claim 20, in the manufacture of a medicament for treating a cancer in a subject.

28. The use of claim 27, wherein the use has one, two, three, four, five, six, or all of (i)-(vii):

10 (i) the cancer is a hematological cancer, a multiple myeloma, and/or a solid tumor, e.g., a solid tumor described herein;

(ii) the antibody molecule, ADC, or composition is administered to the subject intravenously;

(iii) the antibody molecule, ADC, or composition is administered to the subject at a dose between 0.1 mg/kg and 50 mg/kg, between 0.2 mg/kg and 25 mg/kg, between 0.5 mg/kg and 10 mg/kg, between 15 0.5 mg/kg and 5 mg/kg, between 0.5 mg/kg and 3 mg/kg, between 0.5 mg/kg and 2.5 mg/kg, between 0.5 mg/kg and 2 mg/kg, between 0.5 mg/kg and 1.5 mg/kg, between 0.5 mg/kg and 1 mg/kg, between 1 mg/kg and 1.5 mg/kg, between 1 mg/kg and 2 mg/kg, between 1 mg/kg and 2.5 mg/kg, between 1 mg/kg and 3 mg/kg, between 1 mg/kg and 2.5 mg/kg, or between 1 mg/kg and 5 mg/kg;

(iv) the antibody molecule, ADC, or composition is administered to the subject at a fixed dose 20 between 10 mg and 1000 mg, between 10 mg and 500 mg, between 10 mg and 250 mg, between 10 mg and 150 mg, between 10 mg and 100 mg, between 10 mg and 50 mg, between 250 mg and 500 mg, between 150 mg and 500 mg, between 100 mg and 500 mg, between 50 mg and 500 mg, between 25 mg and 250 mg, between 50 mg and 150 mg, between 50 mg and 100 mg, between 100 mg and 150 mg, between 100 mg and 200 mg, or between 150 mg and 250 mg;

25 (v) wherein the antibody molecule, ADC, or composition is administered once a week, twice a week, once every two weeks, once every three weeks, or once every four weeks;

(vi) wherein the use further comprises determining the level of CD138 in a sample from the subject; and/or

(vii) wherein the use further comprises administering to the subject a second therapy for cancer.

30

29. Use of an antibody molecule of any of claims 1-19 an ADC of claim 19, or a composition of claim 20, in the manufacture of a medicament for treating a precancerous condition or preventing a cancer, optionally wherein:

(i) the precancerous condition is smoldering myeloma or monoclonal gammopathy of undetermined significance (MGUS); or  
(ii) the cancer is multiple myeloma.

5

30. Use of an antibody molecule of any of claims 1-18, an ADC of claim 19, or a composition of claim 20, in the manufacture of a medicament for causing the ADCC activity in a cell or subject.

10 31. A method of detecting an anti-CD138 molecule, the method comprising contacting a cell or a subject with an antibody molecule of any of claims 1-18, thereby detecting the CD138 molecule; optionally wherein:

- (i) the antibody molecule is coupled with a detectable label; and/or
- (ii) the CD138 molecule is detected *in vitro*, *ex vivo*, or *in vivo*..

15