WHAT IS CLAIMED:

1. A heterodimeric antibody that binds a tumor-associated antigen and a T cell receptor, the antibody comprising:
    a) a first polypeptide comprising an scFv and a first Fc region, wherein the scFv includes a first heavy chain variable region (VHa) and a first light chain variable region (VLa) joined together by a peptide linker, wherein the scFv is joined to the first Fc region by a first hinge region, and wherein the first heavy chain variable region (VHa) and a first light chain variable region (VLa) form a first antigen binding domain that binds the T cell receptor;
    b) a second polypeptide comprising a second heavy chain variable region (VHb) and a second Fc region, wherein the second heavy chain variable region (VHb) is joined to the second Fc region by a second hinge region; and
    c) a third polypeptide comprising a second light chain variable region (VLb), wherein the second heavy chain variable region (VHb) of the second polypeptide and the second light chain variable region (VLb) of the third polypeptide form a second antigen binding domain that binds the tumor-associated antigen,
    wherein the tumor-associated antigen comprises CD38, and
    wherein the T cell receptor comprises CD3.

2. The heterodimeric antibody of claim 1, wherein
    a) the first heavy chain variable region (VHa) of the first polypeptide comprises the CDR-H1, CDR-H2, and CDR-H3 sequences of a heavy chain variable region sequence selected from SEQ ID NOS:22, 28, 30, 32, 34, 36 and 38;
    b) the first light chain variable region (VLa) of the first polypeptide comprises the CDR-L1, CDR-L2, and CDR-L3 sequences of a light chain variable region sequence selected from SEQ ID NOS:24, 29, 31, 33, 35, 37 and 39;
    c) the second heavy chain variable region (VHb) of the second polypeptide comprises the CDR-H1, CDR-H2, and CDR-H3 sequences of a heavy chain variable region sequence selected from SEQ ID NOS:1, 6, 8, 10, 12, 14, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62 and 64; and

d) the second light chain variable region (VLb) of the third polypeptide comprises the CDR-L1, CDR-L2, and CDR-L3 sequences of a light chain variable region sequence selected from SEQ ID NOS:16, 18, 20, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63 and 65.

3. The heterodimeric antibody of claim 1 or 2, wherein

a) the first heavy chain variable region (VHa) of the first polypeptide comprises an amino acid sequence that is at least 95% identical to one of the sequences selected from SEQ ID NOS:22, 28, 30, 32, 34, 36 and 38;

b) the first light chain variable region (VLa) of the first polypeptide comprises an amino acid sequence that is at least 95% identical to one of the sequences selected from SEQ ID NOS:24, 29, 31, 33, 35, 37 and 39;

c) the second heavy chain variable region (VHb) of the second polypeptide comprises an amino acid sequence that is at least 95% identical to one of the sequences selected from SEQ ID NOS:1, 6, 8, 10, 12, 14, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62 and 64; and

d) the second light chain variable region (VLb) of the third polypeptide comprises an amino acid sequence that is at least 95% identical to one of the sequences selected from SEQ ID NOS:16, 18, 20, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63 and 65.

4. The heterodimeric antibody of claim 1 or 2, wherein

a) the first heavy chain variable region (VHa) of the first polypeptide comprises the amino acid sequence of any one of SEQ ID NOS:22, 28, 30, 32, 34, 36 and 38;

b) the first light chain variable region (VLa) of the first polypeptide comprises the amino acid sequence of any one of SEQ ID NOS:24, 29, 31, 33, 35, 37 and 39;

c) the second heavy chain variable region (VHb) of the second polypeptide comprises the amino acid sequence of any one of SEQ ID NOS:1, 6, 8, 10, 12, 14, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62 and 64; and

d) the second light chain variable region (VLb) of the third polypeptide comprises the amino acid sequence of any one of SEQ ID NOS:16, 18, 20, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63 and 65.

5. The heterodimeric antibody of any one of claims 1-4, wherein

a) first polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:87, and a second polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:89, and a third polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:88 (e.g., BZ1);

b) the first polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:90, and a second polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:92, and a third polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:91 (e.g., BZ1S);

c) the first polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of any one of SEQ ID NOs:71-77, and a second polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:79, and a third polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:85 (e.g., CD38 A2 series);

d) the first polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of any one of SEQ ID NOs:71-77, and a second polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:78, and a third polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:84 (e.g., CD38 A2-3H10m1 series);

e) the first polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of any one of SEQ ID NOs:71-77, and a second polypeptide comprises an amino acid sequence that is at least 95%

identical to the amino acid sequence of any one of SEQ ID NOS:80-83, and a third polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:86 (e.g., CD38 D8 series); or

f) the first polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:100, and a second polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:106, and a third polypeptide comprises an amino acid sequence that is at least 95% identical to the amino acid sequence of SEQ ID NO:86 (e.g., CD38 D8 bump-in-dent series).

6. The heterodimeric antibody of any one of the preceding claims, wherein the first and/or second Fc regions include a LALA mutation, and wherein the first and second Fc regions are mutated to form knob-in-hole or bump-into-dent structures.

7. The heterodimeric antibody of any one of the preceding claims, wherein the first Fc region of the first polypeptide comprises the amino acid sequences of SEQ ID NOS:26 and 27.

8. The heterodimeric antibody of any one of the preceding claims, wherein the second Fc region of the second polypeptide comprises the amino acid sequences of SEQ ID NOS:4 and 5.

9. One or more nucleic acids encoding the first, second, and third polypeptides of the heterodimeric antibody of any one of the preceding claims.

10. One or more vectors comprising the one or more nucleic acids of claim 9, optionally wherein the one or more vectors comprise a first and second vector, and

a) the first vector encodes the first and second polypeptides, and the second vector encodes the third polypeptide;

b) the first vector encodes the second and third polypeptides, and the second vector encodes the first polypeptide; or

c) the first vector encodes the first and third polypeptides, and the second vector encodes the second polypeptide.

11. A host cell, or a population of host cells, harboring the one or more nucleic acids of claim 9 or the one or more vectors of claim 10.

12. A method for preparing a heterodimeric antibody, comprising: culturing a population of host cells under conditions suitable for expressing the first, second and third polypeptides by the population of host cells, wherein individual host cells in the population of host cells harbor the one or more nucleic acids of claim 9 or the one or more vectors of claim 11, optionally wherein the one or more vectors comprise (i) a first vector encoding the first polypeptide and the second polypeptide and (ii) a second vector encoding the third polypeptide.

13. The method of claim 12, further comprising: isolating the first, second and third polypeptides from the population of cells.

14. The method of claim 12 or 13, further comprising: subjecting the first, second and third polypeptides to conditions suitable for associating the first, second and third polypeptides with each other to form the heterodimeric antibody.

15. A method for binding a tumor-associated antigen and a T cell receptor, comprising: contacting the heterodimeric antibody of any one of claims 1-8 with the tumor-associated antigen and the T cell receptor under conditions suitable for binding the heterodimeric antibody to the tumor-associated antigen and the T cell receptor.

16. The method of claim 15, wherein the tumor-associated antigen is expressed by a cell from a cancer of the prostate, breast, ovary, head and neck, bladder, skin, colorectal, anus, rectum, pancreas, lung (including non-small cell lung and small cell lung cancers), brain, esophagus, liver, kidney, stomach, colon, cervix, uterus, endometrium, vulva, larynx, vagina, bone, nasal cavity, paranasal sinus, nasopharynx, oral cavity, oropharynx,

larynx, hypolarynx, salivary glands, ureter, urethra, penis, or testis, or from a leiomyoma, glioma, or glioblastoma.

17. The method of claim 15, wherein the tumor-associated antigen is expressed by a hematologic cancer.

18. The method of claim 17, wherein the hematologic cancer is a B chronic lymphocytic leukemia (B-CLL), B and T acute lymphocytic leukemia (LL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (CML), hairy cell leukemia (HCL), myeloproliferative disorder/neoplasm (MPDS), myelodysplasia syndrome, non-Hodgkin's lymphoma (NHL) including Burkitt's lymphoma (BL), Waldenstrom's Macroglobulinemia, mantle cell lymphoma, AIDS-related lymphoma, Hodgkin's Lymphoma (HL), T cell lymphoma (TCL), multiple myeloma (MM), plasma cell myeloma, plamocytoma, giant cell myeloma, heavy-chain myeloma, or light chain or Bence-Jones myeloma.

19. The method of any one of claims 15-18, wherein the T cell receptor is expressed on an effector T cell and the tumor-associated antigen is expressed by a tumor or cancer cell.

20. The method of claim 19, wherein the effector T cell kills the tumor or cancer cell by mediating cytotoxic cell killing.

21. A method for treating a disease in a subject, comprising: administering to the subject a therapeutically effective amount of the heterodimeric antibody of any one of claims 1-8.

22. Use of the heterodimeric antibody of any one of claims 1-8 for the manufacture of a medicament for treating a disease.

23. The heterodimeric antibody of any one of claims 1-8, for use in treating a disease.

24. The method, use, or heterodimeric antibody for use of any one of claims 21-23, wherein the disease comprises a cancer of the prostate, breast, ovary, head and neck, bladder, skin, colorectal, anus, rectum, pancreas, lung (including non-small cell lung and small cell lung

cancers), brain, esophagus, liver, kidney, stomach, colon, cervix, uterus, endometrium, vulva, larynx, vagina, bone, nasal cavity, paranasal sinus, nasopharynx, oral cavity, oropharynx, larynx, hypolarynx, salivary glands, ureter, urethra, penis, or testis, or from a leiomyoma, glioma, or glioblastoma.

25. The method, use, or heterodimeric antibody for use of any one of claims 21-23, wherein the disease comprises a hematologic cancer.

26. The method, use, or heterodimeric antibody for use of claim 25, wherein the hematologic cancer is B chronic lymphocytic leukemia (B-CLL), B and T acute lymphocytic leukemia (LL), acute myeloid leukemia (AML), chronic lymphocytic leukemia (CLL), chronic myelogenous leukemia (CML), hairy cell leukemia (HCL), myeloproliferative disorder/neoplasm (MPDS), myelodysplasia syndrome, non-Hodgkin's lymphoma (NHL) including Burkitt's lymphoma (BL), Waldenstrom's Macroglobulinemia, mantle cell lymphoma, AIDS-related lymphoma, Hodgkin's Lymphoma (HL), T cell lymphoma (TCL), multiple myeloma (MM), plasma cell myeloma, plamocytoma, giant cell myeloma, heavy-chain myeloma, or light chain or Bence-Jones myeloma.