What we claim is:

1. A lentiviral vector comprising a truncated EF1α promoter for directing the expression of a nucleotide sequence encoding a polypeptide of interest in a host cell, wherein the truncated EF1α promoter is an EF1α core promoter consisting of the nucleotide sequence setting forth in SEQ ID NO: 13,

wherein the lentiviral vector is a non-replicating lentiviral vector,

wherein the lentiviral vector comprises a 5'LTR, a ψ element, an RRE element, a cPPT/CTS element, a truncated EF1α promoter, a WPRE element, a 3'LTR, and a nucleotide sequence encoding the polypeptide of interest, which are operably linked,

wherein the polypeptide of interest is a fusion polypeptide comprising a first protein and a second protein, and the fusion polypeptide comprises a self-cleavable peptide between the first protein and the second protein, and

wherein the first protein is a cancer-associated antigen-specific T cell receptor (TCR) or chimeric antigen receptor (CAR), the second protein is a dominant negative TGF-β type II receptor.

2. The lentiviral vector of claim 1, wherein the 5'LTR comprises the nucleotide sequence set forth in SEQ ID NO: 3 or 11; the ψ element comprises the nucleotide sequence set forth in SEQ ID NO: 4 or 12; the RRE element comprises the nucleotide sequence set forth in SEQ ID NO: 5; the cPPT/CTS element comprises the nucleotide sequence set forth in SEQ ID NO: 6; the WPRE element comprises the nucleotide sequence set forth in SEQ ID NO: 9 or 14; the 3'LTR comprises the nucleotide sequence set forth in SEQ ID NO: 10 or 15.

3. The lentiviral vector of any one of claims 1-2, which comprises a 5'LTR comprising the nucleotide sequence set forth in SEQ ID NO: 11, a ψ element comprising the nucleotide sequence set forth in SEQ ID NO: 12, an RRE element comprising the nucleotide sequence set forth in SEQ ID NO: 5, a cPPT/CTS element comprising the nucleotide sequence set forth in SEQ ID NO: 6, a truncated EF1α promoter consisting of the nucleotide sequence set forth in SEQ ID NO: 13, a WPRE element comprising the nucleotide sequence set forth in SEQ ID NO: 14, a 3'LTR comprising the nucleotide sequence set forth in SEQ ID NO: 15, and the nucleotide sequence encoding the polypeptide of interest, which are operably linked.

4. The lentiviral vector of any one of claims 1 to 3, wherein the polypeptide of interest is a fusion polypeptide comprising a plurality of proteins, and the plurality of proteins in the fusion polypeptide are separated by a self-cleavable peptide.

5. The lentiviral vector of any one of claims 1 to 4, wherein the self-cleavable peptide is a 2A polypeptide, for example, the self-cleavable peptide is selected from P2A, F2A, E2A, or T2A polypeptide, or a functional variant thereof.

6. The lentiviral vector of any one of claims 1 to 5, wherein the dominant negative TGF-β type II receptor comprises the amino acid sequence set forth in SEQ ID NO:18.

7. A method for preparing a lentiviral vector particle, comprising:

a) co-transfecting a suitable host cell with the lentiviral vector of any one of claims 1-6, one or more packaging vectors expressing Gag and/or Pol, and an envelope vector expressing an envelope protein such as VSV-G;

b) culturing the transfected host cell to package the lentiviral vector into a lentiviral vector particle; and

c) harvesting the lentiviral vector particle produced in step b).

8. A lentiviral vector particle comprising the lentiviral vector of any one of claims 1-6.

9. Use of the lentiviral vector particle of claim 8 in the preparation of a therapeutic T cell, wherein the therapeutic T cell expresses a cancer-associated antigen-specific T cell receptor (TCR) or chimeric antigen receptor (CAR), and a dominant negative TGF-β type II receptor.

10. A method for preparing a therapeutic T cell, comprising transducing a T cell with the lentiviral vector particle of claim 8.

11. The method of claim 10, wherein the transduction of the lentiviral vector particle causes the therapeutic T cell to express a cancer-associated antigen-specific T cell receptor (TCR) or chimeric antigen receptor (CAR), and optionally a dominant negative TGF-β type II receptor.