WHAT IS CLAIMED IS:

1. An IL-2 polypeptide comprising one or more non-naturally encoded amino acids, wherein the IL-2 polypeptide has the amino acid sequence of SEQ ID NO: 2, wherein the non-naturally encoded amino acid is incorporated into position 45 of SEQ ID NO: 2, wherein a water-soluble polymer is conjugated to the IL-2 polypeptide through the non-naturally encoded amino acid via a non-cleavable linker, wherein the non-naturally encoded amino acid is para-acetyl-phenylalanine, wherein said IL-2 polypeptide has reduced interaction with its IL-2Rα receptor subunit compared to a wild-type IL-2 polypeptide.

2. The IL-2 polypeptide of claim 1, wherein the water-soluble polymer is a poly(ethylene glycol) (PEG) moiety.

3. The IL-2 polypeptide of claim 2, wherein the PEG moiety is linear or branched.

4. The IL-2 polypeptide of claim 2 or claim 3, wherein the PEG moiety has a molecular weight between 0.1 kDa and 100 kDa, preferably between 0.1 and 50 kDa, more preferably between 10 and 50.

5. The IL-2 polypeptide of any one of claims 1-4, wherein the non-cleavable linker is an oxime linkage.

6. The IL-2 polypeptide of any one of claims 1-5, wherein the IL-2 polypeptide is further linked to a biologically active molecule, a cytotoxic agent, or an immunostimulatory agent, optionally wherein the biologically active molecule, cytotoxic agent, or immunostimulatory agent is linked to the IL-2 polypeptide by a linker, further optionally wherein the linker is a cleavable or non-cleavable linker.

7. The IL-2 polypeptide of any one of claims 1-6, wherein the IL-2 polypeptide is produced in CHO cells.

8. The IL-2 polypeptide of claim 1, wherein the water-soluble polymer is a PEG moiety, wherein the PEG moiety is linear, wherein the PEG moiety has a molecular weight of between 10 kDa and 50 kDa, and wherein the non-cleavable linker is an oxime linkage.

9. The IL-2 polypeptide of any one of claims 1-8, wherein the IL-2 polypeptide provides increased *in vivo* half life, wherein the *in vivo* half-life of the IL-2 polypeptide is increased at least about 5-fold relative to the unmodified polypeptide.

10. A method of making the IL-2 polypeptide of any one claims 1 to 9, the method comprising contacting an isolated IL-2 polypeptide of as defined in any one of claims 1 to 9 with a water-soluble polymer, wherein the water-soluble polymer comprises a moiety that

reacts with the non-naturally encoded amino acid, and wherein the IL-2 polypeptide is obtained by expression in mammalian cells or eukaryotic cells, such as CHO cells.

11. A method of making the IL-2 polypeptide of any one of claims 1-9, the method comprising contacting the IL-2 polypeptide as defined in any of claims 1-9 with a water-soluble polymer, wherein the water-soluble polymer comprises a moiety that reacts with the non-naturally encoded amino acid, and wherein the IL-2 polypeptide is obtained by expression in mammalian cells or eukaryotic cells, such as CHO cells.

12. The method of claim 10 or claim 11, wherein the water-soluble polymer is a poly(ethylene glycol) (PEG) moiety.

13. The method of claim 12, wherein the PEG moiety is linear or branched.

14. The method of claim 12 or claim 13, wherein the PEG moiety has a molecular weight between 0.1 kDa and 100 kDa, preferably between 0.1 and 50 kDa, more preferably between 10 and 50.

15. An IL-2 polypeptide obtained or obtainable by the method of any one of claims 10-14.

16. A composition comprising the IL-2 polypeptide of any one of claims 1-9 and a pharmaceutically acceptable carrier, wherein the IL-2 polypeptides in the composition are homogenous.

17. The IL-2 polypeptide of any one of claims 1-9, or the composition of claim 16, for use in treating a patient having a condition, disease or disorder modulated by IL-2.

18. The IL-2 polypeptide or composition for use according to claim 17, wherein the condition or disease modulated by IL-2 is cancer.

19. Use of the IL-2 polypeptide of any one of claims 1-9, or the composition of claim 17, in the manufacture of a medicament for treating a patient having a condition, disease or disorder modulated by IL-2.

20. The use according to claim 19, wherein the condition or disease modulated by IL-2 is cancer.