CLAIMS

1. A method for de-differentiating or reprogramming a human somatic cell comprising: transfecting the human somatic cell with a composition comprising:

(i) an effective amount of a purified synthetic mRNA encoding reprogramming factor Oct4 fused to an N-terminal MyoD transactivation domain, and

(ii) purified synthetic mRNAs encoding reprogramming factors Sox2, Klf4, cMyc, Nanog, and Lin28;

wherein the synthetic mRNAs are purified through size-exclusion chromatography;

whereby the somatic cell is reprogrammed or de-differentiated.

2. The method of claim 1, wherein the cells are seeded in a density gradient within a well.

3. The method of claim 1, wherein Oct4 is fused to an N-terminal MyoD transactivation domain in tandem triplicates.

4. The method of claim 1, wherein the composition further comprises Rarg and LrH-1 transactivation domains.

5. The method of claim 1, wherein the purified synthetic mRNA comprises 2-thio-uracil.

6. The method of claim 1, wherein the purified synthetic mRNA comprises 5m-CTP and Pseudo-UTP.

7. The method of claim 1, wherein the purified synthetic mRNA comprises an ARCA cap.

8. The method of claim 7, which comprises generating the synthetic mRNA by *in vitro* transcription reactions using a 4:1 ratio of ARCA cap analog to GTP.

9. A method for reprogramming human somatic cells, wherein the method comprises:

growing target cells at a density of 25 k to 250 k cells/well in a standard 6-well plate on a feeder-free surface; and transfecting the cells with any one or more of the purified synthetic mRNA of reprogramming factor of claim 1 in doses ranging from about 50 ng to about 800 ng/ml.

10. The method of claim 1, wherein the method comprises:

growing target cells at a density of 50 k, 75 k, 100 k, or 150 k cells/well in a standard 6-well plate on a feeder-free surface; and

transfecting the cells with any one or more of the purified synthetic mRNA of reprogramming factor of claim 1 in doses ranging from about 50 ng to about 800 ng/ml of mRNA, wherein lower doses are used at earlier time points than later time points; and attaining iPSCs without passaging.

11. The method of claim 1, wherein the method comprises:

growing target cells at a density selected any one of the following: 15K, 30K, 50 k, 75 k, 100 k, 150 k, 250 K, 500 K cells/well in a standard 6-well plate in a feeder-free surface; wherein the volume of each well is adjusted to be between 0.5 ml to 5 ml of appropriate medium; and

transfecting cells with any one or more of the purified synthetic mRNA of reprogramming factor of claim 1 in doses ranging from about 50 ng to 800 ng/ml of mRNA wherein lower doses are used at earlier time points than later time points; and attaining iPSCs without passaging the cells.

12. The method of claim 1, wherein the method is Xeno-free.

13. The method of claim 1, wherein the human somatic cells are selected from the group consisting of unipotent, multipotent, pluripotent, and differentiated cells.

14. The method of claim 1, wherein the synthetic mRNAs induces de-differentiation of the somatic cells to unipotent, multipotent, or pluripotent cells.

15. The method of claim 1, wherein the transfected cells are maintained in culture as induced pluripotent stem (iPS) cells.

16. The method of claim 1, wherein the transfected cells form induced pluripotent stem cells, further comprising inducing the iPS cells to form differentiated cells.

17. A composition for treating or inhibiting one or more symptoms of a disease or disorder in a patient comprising de-differentiated cells according to the method of claim 1, and wherein the cells are to be administered to the patient.