CLAIMS

1. An RNA sensor system comprising:

a) a synthetic single-stranded RNA (ssRNA) sensor comprising an editable stop codon and a payload; and

b) an adenosine deaminase acting on RNA (ADAR) deaminase;

wherein the synthetic ssRNA sensor comprises a degree of sequence complementarity to an endogenous ssRNA target in a human cell and is capable of binding to the endogenous ssRNA target to form a double-stranded RNA (dsRNA) duplex;

wherein the dsRNA duplex comprises a mispairing within the stop codon of the synthetic ssRNA sensor;

wherein the mispairing is editable by the ADAR deaminase, which editing can effectively remove the editable stop codon so as to enable translation and expression of the payload.

2. The RNA sensor system of claim 1, wherein the mispairing within the stop codon of the synthetic ssRNA sensor comprises an adenosine to cytosine mispairing comprising an adenosine in the synthetic ssRNA sensor that is directly opposite to a cytosine in the endogenous ssRNA target in the dsRNA duplex.

3. The RNA sensor system of claim 2, wherein the adenosine of the synthetic ssRNA sensor in the mispairing within the stop codon is edited to an inosine by the ADAR deaminase.

4. The RNA sensor system of claim 1, comprising more than one mispairing.

5. The RNA sensor system of claim 1, wherein the payload comprises a reporter protein, a transcription factor, an enzyme, a transgene protein, or a therapeutic protein.

6. The RNA sensor system of claim 1, wherein the payload comprises a fluorescent reporter.

7. The RNA sensor system of claim 1, wherein the payload comprises an eGFP reporter or a luciferase reporter.

8. The RNA sensor system of claim 1, wherein the ADAR is endogenous or exogenous.

9. The RNA sensor system of claim 1, wherein the ADAR deaminase comprises an RNA editing for programmable A to I (G) replacement (REPAIR) molecule, a Cas13b-ADAR fusion molecule, a Cas13d-ADAR fusion molecule, a Cas7-11-ADAR fusion molecule, and MS2-ADAR fusion molecule, a deaminase domain of ADAR2, a full-length ADAR2, or a truncated ADAR2.

10. A cell logic system comprising:

a) an AND gate comprising:

(i) a synthetic single stranded RNA (ssRNA) sensor comprising one or more payloads, multiple editable stop codons, and a degree of complementarity to different ssRNA targets; and

(ii) an adenosine deaminase acting on RNA (ADAR) deaminase;

wherein the synthetic ssRNA sensor is capable of binding to the ssRNA targets to form a double-stranded RNA (dsRNA) duplex that becomes a substrate for an ADAR deaminase;

wherein the substrate comprises a mispairing within at least one stop codon;

wherein the mispairing in each stop codon is editable by the ADAR deaminase, which editing can effectively remove the stop codon so as to enable translation and expression of the one or more payloads; or

b) an OR gate comprising:

(i) multiple independent synthetic ssRNA sensors comprising a payload, an editable stop codon, and a degree of complementarity to one or more different ssRNA targets; and

(ii) an adenosine deaminase acting on RNA (ADAR) deaminase;

wherein each synthetic ssRNA sensor is capable of binding to the ssRNA targets to form a double-stranded RNA (dsRNA) duplex that becomes a substrate for an ADAR deaminase;

wherein the substrate comprises a mispairing within at least one stop codon; and

wherein the mispairing in each stop codon is editable by the ADAR deaminase, which editing can effectively remove the stop codon so as to enable translation and expression of the one or more payloads.

11. The RNA sensor system of claim 1, wherein the synthetic ssRNA sensor further comprises a normalizing gene.

12. The RNA sensor system of claim 1, wherein the synthetic ssRNA sensor comprises a circular RNA.

13. The RNA sensor system of claim 5, wherein the payload comprises a therapeutic protein.

14. The RNA sensor system of claim 5, wherein the payload comprises a caspase.

15. A method of quantifying ribonucleic acid levels comprising providing an RNA sensor system comprising:

a) a synthetic single-stranded RNA (ssRNA) sensor comprising an editable stop codon and a payload; and

b) an adenosine deaminase acting on RNA (ADAR) deaminase;

wherein the synthetic ssRNA sensor comprises a degree of sequence complementarity to an endogenous ssRNA target in a human cell and is capable of binding to the endogenous ssRNA target to form a double-stranded RNA (dsRNA) duplex;

wherein the dsRNA duplex comprises a mispairing within the stop codon of the synthetic ssRNA sensor;

wherein the mispairing is editable by the ADAR deaminase, which editing can effectively remove the editable stop codon so as to enable translation and expression of the payload.

16. The method of claim 15, wherein the mispairing comprises an adenine to cytidine mispairing in the dsRNA duplex.

17. The method of claim 15, further comprising more than one mispairing.

18. The method of claim 15, wherein the payload comprises a reporter protein, a transcription factor, an enzyme, a transgene protein, a therapeutic protein, an antigen, or an epitope.

19. The method of claim 15, wherein the ADAR is exogenous or endogenous.

20. A method of killing a specific cell or cell type, wherein the method comprises supplying a single-stranded RNA sensor (ssRNA) or guide comprising a stop codon, a payload, and a normalizing gene, wherein the payload is a self-dimerizing caspase, and wherein the ssRNA sensor or guide is capable of binding to an ssRNA target to form a double stranded RNA duplex that becomes a substrate for an adenosine deaminase action on RNA (ADAR) deaminase, and wherein the ssRNA target is enriched in expression in the specific cell or cell type.