cleavage sequence is a thrombin cleavage sequence. In some instances, said amino acid sequence comprises a MRSSHHHHHHSSGLVPRGS (SEQ ID NO: 7) amino acid sequence at said N-terminus. In some instances, said engineered reverse transcription enzyme comprises an amino acid sequence according to SEQ ID NO: 6. In some instances, said engineered reverse transcription enzyme comprises an amino acid sequence according to SEQ ID NO: 5. In some instances, said engineered reverse transcription enzyme has improved ability to capture full-length transcripts as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3. In some instances, said engineered reverse transcription enzyme has higher resistance to cell lysate as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3. In some instances, said engineered reverse transcription enzyme has higher activity in a reaction volume of less than 1 nanoliter as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3. In some instances, said engineered reverse transcription enzyme has increased thermal stability and reverse transcription processivity as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3. In some instances, said engineered reverse transcription enzyme comprises terminal transferase activity and template switching ability.

[0005a] In one aspect, provided herein is an engineered reverse transcription enzyme, comprising an amino acid sequence that is at least 95% identical to SEQ ID NO: 3, wherein said amino acid sequence comprises: (i) a truncation of 15 amino acids to 40 amino acids from the N-terminus relative to SEQ ID NO: 3; and (ii) wherein said amino acid sequence comprises a plurality of mutations selected from the group consisting of an E69 mutation, an Ll39 mutation, a D200 mutation, an E302 mutation, a T306 mutation, a W313 mutation, a T330 mutation, an L435 mutation, a P448 mutation, a D449 mutation, an N454 mutation, a D524 mutation, an L603 mutation, and an E607 mutation relative to SEQ ID NO: 3; wherein said engineered reverse transcription enzyme has higher resistance to cell lysate-mediated inhibition as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3; and/or
wherein said engineered reverse transcription enzyme has higher activity in a reaction volume of less than 1 nanoliter as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3.

[0006] Disclosed herein, in some embodiments, are methods for nucleic acid sample processing, comprising: (a) providing a template ribonucleic acid (RNA) molecule in a reaction volume, and (b) using an engineered reverse transcription enzyme to reverse transcribe said RNA molecule to a complementary DNA molecule, wherein said engineered reverse transcription enzyme comprises an amino acid sequence that is at least 80% identical to SEQ ID NO: 3, wherein said amino acid sequence comprises: (i) a truncation of at least 15

amino acids from the N-terminus relative to SEQ ID NO: 3; and (ii) one or more mutations selected from the group consisting of an E69 mutation, an L139 mutation, a D200 mutation, an E302 mutation, a T306 mutation, a W313 mutation, a T330 mutation, an L435 mutation, a P448 mutation, a D449 mutation, an N454 mutation, a D524 mutation, an L603 mutation, and an E607 mutation relative

CLAIMS

WHAT IS CLAIMED IS:

1. An engineered reverse transcription enzyme, comprising an amino acid sequence that is at least 95% identical to SEQ ID NO: 3, wherein said amino acid sequence comprises:

(i) a truncation of 15 amino acids to 40 amino acids from the N-terminus relative to SEQ ID NO: 3; and

(ii) wherein said amino acid sequence comprises a plurality of mutations selected from the group consisting of an E69 mutation, an Ll39 mutation, a D200 mutation, an E302 mutation, a T306 mutation, a W313 mutation, a T330 mutation, an L435 mutation, a P448 mutation, a D449 mutation, an N454 mutation, a D524 mutation, an L603 mutation, and an E607 mutation relative to SEQ ID NO: 3;

wherein said engineered reverse transcription enzyme has higher resistance to cell lysate-mediated inhibition as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3; and/or

wherein said engineered reverse transcription enzyme has higher activity in a reaction volume of less than 1 nanoliter as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3.

2. The engineered reverse transcription enzyme of claim 1, wherein said engineered reverse transcription enzyme comprises: (i) three or more mutations selected from the group consisting of an Ll39 mutation, a D200 mutation, a T330 mutation, a P448 mutation, a D449 mutation, a D524 mutation, and a L603 mutation relative to SEQ ID NO: 3; and (ii) three or more mutations selected from the group consisting of an E69 mutation, an E302 mutation, a T306 mutation, a W313 mutation, an L435 mutation, and an N454 mutation relative to SEQ ID NO: 3.

3. The engineered reverse transcription enzyme of claim 2, wherein said engineered reverse transcription enzyme comprises: (i) three or more mutations selected from the group consisting of an L139P mutation, a D200N mutation, a T330P mutation, a P448A mutation, a D449G mutation, a D524N or D524A mutation, and a L603W mutation relative to SEQ ID NO: 3; and

(ii) three or more mutations selected from the group consisting of an E69K mutation, an E302R mutation, a T306K mutation, a W313F mutation, an L435G or L435K mutation, and an N454K mutation relative to SEQ ID NO: 3.

4. The engineered reverse transcription enzyme of claim 1, wherein said engineered reverse transcription enzyme comprises: an E69 mutation, an Ll39 mutation, a D200 mutation, an E302 mutation, a T306 mutation, a W313 mutation, a T330 mutation, an L435 mutati on, a P448 mutation, a D449 mutation, an N454 mutation, a D524 mutation, an L603 mutation, and an E607 mutation relative to SEQ ID NO: 3.

5. The engineered reverse transcription enzyme of claim 4, wherein said engineered reverse transcription enzyme comprises: an E69K mutation, an Ll39P mutation, a D200N mutation, an E302R mutation, a T306K mutation, a W313F mutation, a T330P mutation, an L435G or L435K mutation, a P448A mutation, a D449G mutation, an N454K mutation, a D524N or D524A mutation, an L603W mutation, and an E607K mutation relative to SEQ ID NO: 3.

6. The engineered reverse transcription enzyme of claim **1,** wherein said truncation comprises a truncation of at least 20 amino acids from said N-terminus relative to SEQ ID NO: 3.

7. The engineered reverse transcription enzyme of claim **1,** wherein said truncation comprises a truncation of 23 amino acids from said N-terminus relative to SEQ ID NO: 3.

8. The engineered reverse transcription enzyme of claim 1, wherein said engineered reverse transcription enzyme further comprises an affinity tag at said N-terminus or at a C-terminus of said amino acid sequence.

9. The engineered reverse transcription enzyme of claim 1, wherein said amino acid sequence comprises a MRSSHHHHHHSSGLVPRGS (SEQ ID NO: 7) amino acid sequence at said N-terminus.

10. The engineered reverse transcription enzyme of claim **1,** wherein said engineered reverse transcription enzyme comprises an amino acid sequence according to SEQ ID NO: 6.

11. The engineered reverse transcription enzyme of claim 1, wherein said engineered reverse transcription enzyme comprises an amino acid sequence according to SEQ ID NO: 5.

12. The engineered reverse transcription enzyme of claim **1,** wherein said engineered reverse transcription enzyme has improved ability to capture full-length transcripts as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3.

13. The engineered reverse transcription enzyme of claim **1,** wherein said engineered

reverse transcription enzyme has increased thermal stability and reverse transcription processivity as compared to a reverse transcriptase enzyme consisting of SEQ ID NO: 3.

14. The engineered reverse transcription enzyme of claim 11, wherein said engineered reverse transcription enzyme comprises terminal transferase activity and template switching ability.

15. A kit for performing a reverse transcription reaction, comprising:

a. an engineered reverse transcription enzyme comprising (i) a truncation of 15 amino acids to 40 amino acids from the N-terminus relative to SEQ ID NO: 3; and (ii) a plurality of mutations selected from the group consisting of an E69 mutation, an Ll39 mutation, a D200 mutation, an E302 mutation, a T306 mutation, a W313 mutation, a T330 mutation, an L435 mutation, a P448 mutation, a D449 mutation, an N454 mutation, a D524 mutation, an L603 mutation, and an E607 mutation relative to SEQ ID NO: 3; and

b. instructions for using said engineered reverse transcription enzyme to perform a reverse transcription reaction.

16. The kit of claim 15, wherein said engineered reverse transcription enzyme comprises an amino acid sequence according to SEQ ID NO: 5 or 6.