

What is claimed is:

1. A recombinant UvsX recombinase comprising an amino acid sequence that is at least 95% identical to SEQ ID NO: 1, which recombinant UvsX comprises at least one amino acid substitution mutation at the positions functionally equivalent to Pro321 and Asp334 in the RB49 UvsX amino acid sequence SEQ ID NO: 1, and wherein said UvsX recombinase polypeptide demonstrates recombinase activity.
2. The recombinant UvsX recombinase of claim 1, wherein the at least one substitution mutation comprises a mutation to a charged residue.
3. The recombinant UvsX recombinase of claim 1 or 2, wherein the at least one substitution mutation comprises a mutation to a basic residue.
4. The recombinant UvsX recombinase of any of the preceding claims, wherein the at least one substitution mutation comprises a mutation homologous to Pro321Lys in the RB49 UvsX amino acid sequence.
5. The recombinant UvsX recombinase of any of the preceding claims, wherein the at least one substitution mutation comprises a mutation homologous to Asp334Lys in the RB49 UvsX amino acid sequence.
6. The recombinant UvsX recombinase of any of the preceding claims, wherein the at least one substitution mutation comprises mutations homologous to Pro321Lys and Asp334Lys in the RB49 UvsX amino acid sequence.
7. The recombinant UvsX recombinase of any of the preceding claims, further comprising a substitution mutation at a position functionally equivalent to Pro256 in the RB49 UvsX amino acid sequence.
8. The recombinant UvsX recombinase of claim 7, which comprises a substitution mutation homologous to Pro256Lys in the RB49 UvsX amino acid sequence.
9. The recombinant UvsX recombinase of any of the preceding claims, further comprising a substitution mutation at a position functionally equivalent to His63 in the RB49 UvsX amino acid sequence.

10. The recombinant UvsX recombinase of claim 9, which comprises a substitution mutation homologous to His63Ser in the RB49 UvsX amino acid sequence.

11. The recombinant UvsX recombinase of any of the preceding claims, further comprising a mutation selected from the group consisting of: the addition of one or more glutamic acid residues at the C-terminus, the addition of one or more aspartic acid residues at the C-terminus, and a combination thereof.

12. A recombinant UvsX recombinase comprising the amino acid sequence of SEQ ID NO: 2.

13. The recombinant UvsX recombinase of claim 12, further comprising a substitution mutation at Pro256 in the amino acid sequence of SEQ ID NO: 2.

14. The recombinant UvsX recombinase of claim 13, which comprises a Pro256Lys substitution mutation in the SEQ ID NO: 2 amino acid sequence.