The Claims defining the Invention are as follows:

1. An engineered polypeptide comprising an amino acid sequence with at least 90% sequence identity to the reference sequence of SEQ ID NO:8 and a substitution at the position corresponding to amino acid 239 of SEQ ID NO:8 wherein the polypeptide has imine reductase activity.

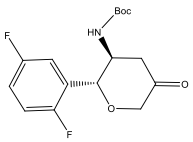
2. An engineered polypeptide comprising an amino acid sequence with at least 90% sequence identity to the reference sequence of SEQ ID NO:8 and a substitution at the position corresponding to amino acid 330 of SEQ ID NO:8, wherein the engineered polypeptide has a valine, threonine, tryptophan, glutamic acid, or tyrosine at the position corresponding to amino acid 283 of SEQ ID NO:8, and wherein the polypeptide has imine reductase activity.

3. The engineered polypeptide of Claim 2, wherein the amino acid sequence comprises at least one residue difference as compared to the reference sequence of SEQ ID NO:4, selected from X198, X153, X167, X265, X262, X108, X234, X284, X282, X220, X272, X256, X267, X242, X281, X197, X277, X224, and X143.

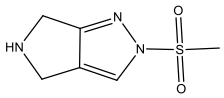
4. The engineered polypeptide of Claim 2, wherein the amino acid sequence comprises at least one residue difference as compared to the reference sequence of SEQ ID NO:6, selected from: X262, X9, X259, X220, X267, X153, X279, X200, X224, X256, X137, X143, X260, X261, X154, X276, and X185.

5. The engineered polypeptide of Claim 2, wherein the amino acid sequence comprises at least one residue difference as compared to the reference sequence of SEQ ID NO:8, selected from: X12, X31, X37, X44, X46, X48, X55, X56, X65, X82, X93, X98, X108, X137, X138, X141, X142, X143, X153, X154, X155, X156, X159, X166, X168, X173, X177, X178, X184, X185, X195, X197, X199, X200, X201, X203, X205, X206, X210, X213, X215, X216, X218, X220, X221, X223, X226, X234, X239, X242, X245, X251, X253, X256, X257, X259, X260, X261, X262, X263, X265, X266, X267, X268, X269, X273, X274, X277, X278, X279, X280, X281, X282, X284, X285, X289, X290, X291, X292, X293, X294, and X349.

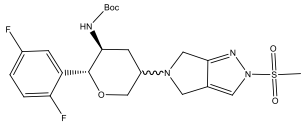
6. The engineered polypeptide of Claim 2, wherein the imine reductase activity comprises converting the ketone substrate



and the amino substrate



to produce the amine product compound



under suitable reaction conditions.

7. The engineered polypeptide of Claim 6, wherein the imine reductase activity in converting the ketone and amine substrate compound pair to the amine product compound under suitable reaction conditions is increased at least 2-fold as compared to the corresponding activity of the reference polypeptide of SEQ ID NOS:4, 6, 12, 30, 126, 173, 360, and/or 550.

8. The engineered polypeptide of Claim 1, wherein the amino acid sequence of the engineered polypeptide comprises SEQ ID NO:1188.