CLAIMS

We claim:

1. An engineered peroxidase comprising a polypeptide sequence having at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 4, and wherein said engineered peroxidase comprises a substitution at position 393, wherein the amino acid positions of said polypeptide sequence are numbered with reference to SEQ ID NO: 4.

2. The engineered peroxidase of Claim 1, wherein said polypeptide sequence has at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 6, and wherein said engineered peroxidase further comprises at least one substitution or substitution set at one or more positions in said polypeptide sequence selected from 25/29/43, 25/29/65/82/92, 80/128/306, 90, 127/301, 128/307, 143, 160, 160/188, 160/307, 164, 168, 171/260, 185, 185/307, 191, 191/260, 191/469, 202, 206, 208, 221, 222, 224, 224/260, 228, 228/260, 241/270/283/306, 260/307, 301, 306, 307, 311, 332, and 367, wherein the amino acid positions of said polypeptide sequence are numbered with reference to SEQ ID NO: 6.

3. The engineered peroxidase of Claim 1, wherein said engineered peroxidase comprises a polypeptide sequence that is at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or more identical to the sequence of at least one engineered peroxidase variant set forth in SEQ ID NO: 6.

4. The engineered peroxidase of Claim 1, wherein said engineered peroxidase is a variant engineered peroxidase set forth in SEQ ID NO: 6.

5. The engineered peroxidase of Claim 1, wherein said engineered peroxidase comprises a polypeptide sequence that is at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99% or more identical to the sequence of at least one engineered peroxidase variant set forth in the even numbered sequences of SEQ ID NOS: 6, and 172-290.

6. The engineered peroxidase of Claim 1, wherein said engineered peroxidase comprises a polypeptide sequence forth in the even numbered sequences of SEQ ID NOS: 6, and 172-290.

7. The engineered peroxidase of any one of Claims 1 to 6, wherein said engineered peroxidase comprises at least one improved property compared to wild-type *Anabaena (Nostoc) sp*. peroxidase.

8. The engineered peroxidase of Claim 7, wherein said improved property comprises improved activity on a substrate.

9. The engineered peroxidase of Claim 8, wherein said substrate comprises 10-acetyl-3,7-dihydroxyphenoxazine.

10. A polynucleotide sequence encoding at least one engineered peroxidase, wherein said polynucleotide sequence comprises at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 5, wherein the polynucleotide sequence of said engineered peroxidase comprises at least one substitution at one or more positions.

11. A polynucleotide sequence encoding at least one engineered peroxidase comprising at least 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 5, or a functional fragment thereof.

12. The polynucleotide sequence of Claim 10 or Claim 11, wherein said polynucleotide sequence is operably linked to a control sequence.

13. A polynucleotide sequence encoding at least one engineered peroxidase comprising the sequence of SEQ ID NO: 5.

14. The polynucleotide sequence of Claim 13, wherein said polynucleotide sequence is operably linked to a control sequence.

15. The polynucleotide sequence of Claim 10 or Claim 11, wherein the polynucleotide sequences comprises at least 98% sequence identity to SEQ ID NO:5, or a functional fragment thereof and wherein the polynucleotide sequence encodes a polypeptide having a substitution or substitution set selected from the group consisting of 25/29/43, 25/29/65/82/92, 80/128/306, 90, 127/301, 128/307, 143, 160, 160/188, 160/307, 164, 168, 171/260, 185, 185/307, 191, 191/260, 191/469, 202, 206, 208, 221, 222, 224, 224/260, 228, 228/260, 241/270/283/306, 260/307, 301, 306, 307, 311, 332, and 367, wherein the amino acid positions of said polypeptide sequence are numbered with reference to SEQ ID NO: 6.