CLAIMS

We claim:

1. An engineered peroxidase comprising a polypeptide sequence having at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 6, or a functional fragment thereof, wherein said engineered peroxidase comprises at least one substitution or substitution set in said polypeptide sequence, and wherein the amino acid positions of said polypeptide sequence are numbered with reference to SEQ ID NO: 6.

2. The engineered peroxidase of Claim 1, wherein said polypeptide sequence has at least 85%, 86%, 87%, 88%, 89%, 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 at least one substitution or substitution set at one or more positions in said polypeptide sequence selected from 393, 25/29/43, 25/29/65/82/92, 26/29, 80/128/306, 90, 127/168, 127/301, 128/307, 143, 160, 160/188, 160/307, 164, 168, 171/260, 185, 185/307, 189/190/226, 191, 191/260, 191/469, 202, 206, 208, 221, 222, 224, 224/260, 226, 228, 228/260, 241/270/283/306, 260/307, 290, 301, 306, 307, 311, 332, and 367, and wherein the amino acid positions of said polypeptide sequence are numbered with reference to SEQ ID NO: 4.

3. The engineered peroxidase of Claim 1, wherein said polypeptide sequence has at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 6, and wherein said engineered peroxidase comprises at least one substitution or substitution set at one or more positions in said polypeptide sequence selected from 393, 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.

4. 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 Table 5.1 and/or 6.1

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 SEQ ID NO: 6.

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

7. 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: 6-290.

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

9. The engineered peroxidase of any one of Claims 1 to 8, wherein said engineered peroxidase comprises at least one improved property compared to wild-type *Anabaena (Nostoc) sp*. peroxidase.

10. The engineered peroxidase of Claim 9, wherein said improved property comprises improved activity on a substrate.

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

12. A polynucleotide sequence encoding at least one engineered peroxidase, wherein said polynucleotide sequence comprises at least 85%, 86%, 87%, 88%, 89%, 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.

13. A polynucleotide sequence encoding at least one engineered peroxidase comprising at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 5, or a functional fragment thereof.

14. The polynucleotide sequence of Claim 12 or Claim 13, wherein said polynucleotide sequence is operably linked to a control sequence.