CLAIMS

What is claimed is:

1. A method for detecting accessible chromatin in fixed cells, comprising:
(a) obtaining a transposase complex comprising a transposase bound to two DNA adapters, wherein said first DNA adapter comprises a first recognition sequence for said transposase, and said second DNA adapter comprises a second recognition sequence for said transposase, and wherein said first or said second DNA adapter comprises a detectable label;
(b) contacting chromatin in said fixed cells with said transposase complex under conditions suitable for transposition, thereby joining said first DNA adapter and said second DNA adapter to said chromatin at said accessible regions in said chromatin;
(c) detecting said detectable label;
(d) adding a reverse crosslink solution; and
(e) preparing sequencing libraries.

2. The method of claim 1, wherein said first and said second DNA adapter comprise a detectable label.

3. The method of claim 2 or 3, wherein said first DNA adapter comprises i) a first oligonucleotide comprising the nucleotide sequence of SEQ ID NO: 1 or a nucleotide sequence having at least 95% identity to the sequence of SEQ ID NO: 1, and ii) a second oligonucleotide comprising the nucleotide sequence of SEQ ID NO: 2 or SEQ ID NO: 3, or a nucleotide sequence having at least 95% identity to the sequence of SEQ ID NO: 2 or SEQ ID NO: 3.

4. The method of claim 3, wherein said first DNA adapter comprises a first oligonucleotide comprising the nucleotide sequence of SEQ ID NO: 1 and a second oligonucleotide comprising the nucleotide sequence of SEQ ID NO: 2, and said second DNA adapter comprises a first oligonucleotide comprising the nucleotide sequence of SEQ ID NO: 1 and a second oligonucleotide comprising the nucleotide sequence of SEQ ID NO: 3.

5. The method of any one of claims 1-4, wherein said detectable label is a fluorophore, a metal particle, a magnetic particle, an isotopic label, a chemiluminescent label, a ligand, a mass tag, a quantum dot, or a hapten.

6. The method of claim 5, wherein said fluorophore is an ATTO fluorescent dye.

7. The method of any one of claims 1-6, wherein said detecting comprises performing fluorescence imaging or flow cytometry.

8. The method of any one of claims 1-7, wherein said detecting comprises performing electron microscopy.

9. The method of any one of claims 1-7, wherein said detecting comprises performing mass cytometry.

10. The method of any one of claims 1-9, further comprising identifying regulatory elements, a transcription factor binding site, or a nucleosome binding site in said accessible chromatin.

11. The method of any one of claims 1-10, further comprising mapping positions of sites that said DNA adapters insert into said accessible chromatin.

12. The method of any one of claims 1-11, further comprising sequencing DNA at sites where said DNA adapters insert into said accessible chromatin.

13. The method of any one of claims 1-12, further comprising sequencing said sequencing libraries.

14. The method of any one of claims 1-13, further comprising (i) sorting cells based on labeling of their accessible chromatin by said detectable label, or (ii) generating tagged nucleic acid fragments from said chromatin, and amplifying or sequencing said tagged nucleic acid fragments.

15. The method of any one of claims 1-14, wherein said transposase is a MuA transposase.

16. The method of any one of claims 1-15, wherein said transposase is a Tn transposase.

17. The method of claim 16, wherein said Tn transposase is a Tn5 transposase.

18. The method of claim 17, wherein said Tn5 transposase is a hyperactive Tn5 transposase.