

CLAIMS

WHAT IS CLAIMED IS:

1. A method of processing a peptide, comprising:
 - (a) providing said peptide, wherein said peptide comprises a plurality of amino acids;
 - (b) coupling a linker comprising a polymerizable molecule to an amino acid of said plurality of amino acids, thereby yielding an amino acid-linker complex;
 - (c) cleaving said amino acid-linker complex from said peptide;
 - (d) coupling an additional linker comprising an additional polymerizable molecule to another amino acid of said plurality of amino acids, thereby yielding an additional amino acid-linker complex;
 - (e) coupling said additional amino acid-linker complex to said amino acid-linker complex of (c), thereby generating a stacked amino acid-linker complex, wherein a distance between said amino acid and said additional amino acid is increased in said stacked amino acid-linker complex.
2. The method of claim 1, wherein said cleaving is performed using a chemical stimulus.
3. The method of claim 2, wherein said chemical stimulus comprises application of an acid.
4. The method of claim 3, wherein said acid is a Lewis acid.
5. The method of claim 1, further comprising, repeating (d)-(e), thereby intramolecularly expanding said peptide.
6. The method of claim 1, wherein (b) comprises (i) providing said linker comprising said polymerizable molecule, wherein said linker comprises an amino acid reactive moiety; and (ii) reacting said amino acid reactive moiety with said amino acid, thereby generating said amino acid-linker complex.
7. The method of claim 6, wherein said amino acid reactive moiety is an isothiocyanate, a thioacetylation agent, a thioacylation agent, a thiobenzoylation agent, or a guanidinylation agent.
8. The method of claim 1, further comprising (f) cleaving said additional amino acid-linker complex from said peptide.
9. The method of claim 1, wherein said peptide is coupled to a capture moiety, and wherein (b) further comprises, coupling said capture moiety to said linker.

10. The method of claim 9, wherein said coupling of said capture moiety to said linker is mediated via said polymerizable molecule.
11. The method of claim 9, wherein said capture moiety comprises a nucleic acid barcode molecule.
12. The method of claim 11, wherein said nucleic acid barcode molecule identifies said peptide.
13. The method of claim 11, wherein said capture moiety comprises a unique molecular identifier (UMI) sequence.
14. The method of claim 1, wherein said polymerizable molecule comprises a nucleic acid molecule.
15. The method of claim 14, wherein said nucleic acid molecule is composed predominantly of pyrimidines.
16. The method of claim 15, wherein said nucleic acid molecule is composed entirely of pyrimidines.
17. The method of claim 14, wherein said nucleic acid molecule comprises a polynucleotide analog.
18. The method of claim 17, wherein said polynucleotide analog comprises a 7-deaza purine analog, 8-halopurine analog, or 5-halopyrimidine analog.
19. The method of claim 1, wherein said amino acid comprises a post-translational modification.
20. The method of claim 1, wherein said peptide is derived from a biological sample.
21. The method of claim 1, wherein said amino acid is a terminal amino acid.
22. The method of claim 1, further comprising, measuring a signal of said stacked amino acid-linker complex, thereby generating a measured signal, wherein said measured signal is a current signal.
23. The method of claim 1, wherein said amino acid-linker complex comprises a thiocarbamyl, thiazolinone or thiohydantoin-derivatized amino acid.
24. The method of claim 1, wherein said polymerizable molecule comprises temporal information or spatial information.

25. The method of claim 1, wherein said polymerizable molecule comprises temporal information, wherein said temporal information comprises a cycle or round that said polymerizable molecule is provided.
26. The method of claim 1, wherein during (a), said peptide is coupled to a substrate.
27. The method of claim 1, wherein said polymerizable molecule comprises a nucleic acid molecule, and further comprising, using a nanopore or a nanogap to sequence said nucleic acid molecule.
28. The method of claim 1, further comprising, translocating said stacked amino acid-linker complex through a nanopore or a nanogap, measuring a signal during said translocating, thereby generating a measured signal, and using said measured signal to identify an amino acid type of said stacked amino acid-linker complex.
29. The method of claim 1, wherein said polymerizable molecule comprises a synthetic polymer.