

CLAIMS

1. A well plate comprising a surface ~~for presenting an antigen, wherein the surface~~^{having} has a first region which is a reactive moiety-presenting covalently functionalized region or an activating moiety-presenting covalently functionalized region, wherein the reactive moiety is an azido moiety, an alkynyl moiety, a biotin moiety or a streptavidin moiety and the activating moiety is a lymphocyte-activating moiety; wherein the first region has an area of ~~0.52~~ mm² to ~~50-35~~ mm².
2. The well plate of claim 1, wherein the first region has a dimension of 0.5 mm to 4.0 mm.
3. The well plate of claim 1, wherein the first region is substantially circular and has a diameter of ~~0.52~~ mm to 4.0 mm.
4. The well plate of claim 1, wherein the surface of the well plate further comprises a second region which is a covalently modified region comprising surface blocking ligands, wherein the second region surrounds the first region.
5. The well plate of any one of claims 1 to 4, wherein the surface of the well plate comprises glass, polystyrene, polypropylene, polycarbonate, polyethylene, cycloolefin copolymer, or melamine.
6. The well plate of any one of claims 1 to 5, wherein the first region has a density of respective reactive moieties or activating moieties of at least 50/um².
7. The well plate of any one of claims 1 to 6, wherein the first region comprises respective reactive moieties or activating moieties linked covalently to the surface via a linker having from 5 to 20 backbone atoms selected from carbon, silicon, nitrogen and oxygen.
8. The well plate of any one of claims 1 to 7, wherein the reactive moiety is streptavidin, and the streptavidin is covalently attached to the first region of the surface of the well plate.
9. The well plate of any one of claims 1 to 7, wherein the reactive moiety is streptavidin, and the streptavidin is non-covalently attached to a biotin moiety which is itself covalently attached to the first region of the surface of the well plate.
10. The well plate of any one of claims 1 to 9, wherein the first region is an activating moiety-presenting covalently functionalized region comprising a plurality of specifically bound primary activating molecular ligands and a plurality of specifically bound co-activating molecular ligands.
11. The well plate of claim 10, wherein a ratio of the primary activating molecular ligands to the co-activating molecular ligands on the first region of the surface is 1:5 to 2:1.

12. The well plate of claim 10 or 11, wherein each ligand of the plurality of specifically bound primary activating molecular ligands comprises a major histocompatibility complex (MHC) molecule configured to bind to a T cell receptor (TCR) of a T cell.
13. The well plate of claim 12, wherein the MHC molecule further comprises an antigenic peptide.
14. The well plate of claim 13, wherein the antigenic peptide is a tumor-associated antigen, a viral antigen, a bacterial antigen, a fungal antigen, or a protozoan antigen.
15. The well plate of claim 14, wherein the antigenic peptide is a tumor-associated antigen, and optionally, wherein the tumor-associated antigen is SLC45A2, TCL1, VCX3A, MART1 or NYESO1.
16. The well plate of claim 14, wherein the MHC molecule is connected to the activating moiety-presenting covalently functionalized region via a C-terminal linkage.
17. The well plate of any one of claims 10 to 16, wherein each ligand of the plurality of specifically bound co-activating molecular ligands comprises a T cell receptor (TCR) co-activating molecule or an adjunct TCR activating molecule.
18. The well plate of claim 17, wherein a ratio of the TCR co-activating molecules to the adjunct TCR activating molecules of the plurality of specifically bound co-activating molecular ligands is 3:1 to 1:3.
19. The well plate of claims 17 or 18, wherein the TCR co-activating molecules comprise:
 - a CD28 binding protein, or a fragment thereof which retains binding ability to CD28;
and/or
 - a CD80 molecule or a fragment thereof which retains binding activity to CD28.
20. The well plate of any one of claims 17 to 19, wherein the TCR co-activating molecules comprises an anti-CD28 antibody or a fragment thereof, wherein the fragment retains binding activity to CD28.
21. The well plate of any one of claims 17 to 20, wherein the adjunct TCR activating molecule comprises:
 - a CD2 binding protein, or a fragment thereof which retains binding activity to CD2;
and/or
 - a CD58 molecule or fragment thereof which retains binding activity with CD2.

22. The well plate of any one of claims 17 to 21, wherein the adjunct TCR activating molecule includes an anti-CD2 antibody or a fragment thereof, wherein the fragment retains binding activity with CD2.
23. The well plate of any one of claims 10 to 22, wherein
the plurality of specifically bound primary activating molecular ligands has a density of at least 1×10^2 molecules per square micron in the first region; and/or
the plurality of specifically bound co-activating molecular ligands has a density of at least 1×10^2 molecules per square micron in the first region.
24. A well plate, wherein the well plate comprises one or more wells and each of the one or more wells of the well plate comprises the surface and the first region thereof of the well plate of any one of claims 1 to 23.
25. The well plate of claim 24, wherein the first region of each of the one or more wells is located on a bottom surface of the corresponding well(s).
26. The well plate of claims 24 or 25, wherein an area of each first region is less than about 25% of an area of the bottom surface of the corresponding well(s).
27. A kit for preparing a well plate comprising a surface for presenting an antigen, wherein the surface has~~having~~ an activating moiety-presenting covalently functionalized region, comprising:

a well plate comprising a surface comprising a reactive moiety-presenting covalently functionalized region, wherein the reactive moiety is an azido moiety, an alkynyl moiety, a biotin moiety or a streptavidin moiety; and

an activating reagent; wherein the reactive moiety-presenting covalently functionalized region has an area of ~~0.52~~ mm² to ~~50.35~~ mm².
28. The kit of claim 27, wherein when the reactive moiety is an azido moiety or an alkynyl moiety, the kit comprises a surface functionalization reagent, and wherein the surface functionalization reagent is a biotin containing reagent or a streptavidin containing reagent configured to react with the reactive moiety.
29. The kit of claim 27 or 28, wherein the activating reagent comprises a primary activating reagent comprising a plurality of major histocompatibility complex (MHC) molecules configured to bind with a T cell receptor of the T cell, and configured to bind to a binding site of streptavidin or a plurality of CD3 binding molecules.
30. The kit of claim 29, further comprising a co-activating reagent comprising a plurality of co-activating molecules, each configured to bind a binding site of streptavidin, and wherein

each of the co-activating molecules comprises a CD2 binding molecule or a CD28 binding molecule.

31. The kit of any one of claims 27 to 30, wherein the surface of the well plate further comprises a surface blocking region, comprising a reactive moiety-presenting covalently functionalized region, wherein the reactive moiety is an azido moiety or an alkynyl moiety.
32. The kit of any one of claims 27 to 31, further comprising a surface blocking reagent comprising a surface blocking moiety linked to a reactive group; wherein the reactive group is configured to:
 - react with an oxide moiety of the surface of the well plate and thereby link the surface blocking moiety with the surface; or
 - react with the reactive moiety comprising an azido moiety or an alkynyl moiety of the surface of the well plate and thereby couple the surface blocking moiety with the reactive moiety.
33. The kit of claim 32, wherein the surface blocking moiety is a hydrophilic or negatively charged moiety.