CLAIMS:

1. A particle having at least one surface and an agent immobilized on the surface, wherein:
the agent selectively binds to a target that is a first member of a specific binding pair;
binding of the target to the particle inhibits the interaction of the target with a second member of the specific binding pair; and
(i) the particle comprises a coating, wherein the coating inhibits the agent from binding to a molecule on the surface of a cell, or
(ii) the particle comprises a core subparticle and a plurality of protecting subparticles;
the agent is immobilized on the core subparticle; and
the plurality of protecting subparticles inhibits the agent from binding to a molecule on the surface of a cell.

2. A particle, comprising a surface and an agent immobilized on the surface, wherein:
the agent can selectively bind to a target;
binding of the agent to the target inhibits interactions between the target and a cell; and
(i) the particle comprises a coating, wherein the coating inhibits the agent from binding to a molecule on the surface of a cell, or
(ii) the particle comprises a core subparticle and a plurality of protecting subparticles;
the agent is immobilized on the core subparticle; and
the plurality of protecting subparticles inhibits the agent from binding to and a molecule on the surface of a cell.

3. The particle of claim 1 or 2, wherein
the particle comprises a coating, and
the coating comprises a plurality of coating moieties or coating molecules.

4. The particle of claim 3, wherein the plurality of coating moieties or coating molecules inhibits interactions between the agent and molecules on a cell surface.

5. The particle of claim 3 or 4, wherein the plurality of coating moieties or coating molecules increases the clearance of the particle *in vivo*.

6. The particle of claim 5, wherein the plurality of coating moieties or coating molecules increase the clearance of the particle by phagocytosis, renal clearance, or hepatobiliary clearance.

7. The particle of claim 3 or 4, wherein the plurality of coating moieties or coating molecules decreases the clearance of the particle *in vivo*.

8. The particle of any one of claims 3 to 7, wherein the plurality of coating moieties or coating molecules comprises a polymer.

9. The particle as claimed in claim 8, wherein the polymer is selected from polyethylene glycol (PEG), a sugar, a lipid, a poly(amino acid), polyglutamic acid, polylactate, a polylactic acid, polyglycolic acid (PGA), polylactic acid (PLA), poly(lactic-co-glycolic acid) (PLGA), polyvinyl acetate (PVA), and a combination or copolymer thereof.

10. The particle of any one of claims 3 to 8, wherein the plurality of coating moieties or coating molecules is biodegradable.

11. The particle of any one of claims 3 to 10, wherein:
the particle comprises an interior surface and an exterior surface;
the agent is immobilized on the interior surface and the exterior surface;
the plurality of coating moieties or coating molecules are bound to the exterior surface; and
the coating moieties or coating molecules inhibit interactions between the agent and molecules on a cell surface.

12. The particle of any one of claims 1-11, wherein:
the particle is porous;
the surface comprises exterior surfaces and interior surfaces; and
the inner surfaces consist of the interior walls of the pores of the particle.

13. The particle of claim 12, wherein the agent is immobilized on the interior surfaces.

14. The particle of any one of claims 1-13,
wherein the particle is dendritic;
wherein the particle is substantially cubic, pyramidal, conic, spherical, tetrahedral, hexahedral, octahedral, dodecahedral, or icosahedral;
wherein the particle comprises one or more outward-facing protrusions;
wherein the particle comprises two intersecting ridges extending from the surface of the particle;
wherein the particle comprises a tube; or
wherein the particle is a 2-dimensional shape.

15. The particle of any one of claims 1-14, wherein:
the particle comprises a core subparticle and a plurality of protecting subparticles; and
the agent is immobilized on the core subparticle.

16. The particle of claim 15, wherein the core subparticle is about 100 nm to about 2 μm in size.

17. The particle of claim 15 or claim 16, wherein the protecting subparticles are about 10 nm to about 1 μm in size.

18. The particle of any one of claims 15 to 17, wherein the particle comprises 4 to 10^6 protecting subparticles.

19. The particle of any one of claims 15 to 18, wherein the particle comprises more than one core subparticle.

20. The particle of any one of claims 1-19, wherein
(i) the coating sterically inhibits the agent from binding to a molecule on the surface of a cell, or
(ii) the plurality of protecting subparticles sterically inhibits the agent from binding to a molecule on the surface of a cell.

21. The particle of claim 20, wherein

(i) the coating sterically inhibits the agent from binding to a target on the surface of a cell, or

(ii) the plurality of protecting subparticles sterically inhibits the agent from binding to a target on the surface of a cell.

22. The particle of any one of the preceding claims, wherein

(i) the coating reduces the agent's ability to activate a cell surface receptor protein on the surface of a cell, relative to the ability of a natural ligand of the cell surface receptor protein, or

(ii) the plurality of protecting subparticles reduces the agent's ability to activate a cell surface receptor protein on the surface of a cell, relative to the ability of a natural ligand of the cell surface receptor protein.

23. The particle of claim 22, wherein the agent does not activate the cell surface receptor protein on the surface of a cell.

24. The particle of any one of claims 1-23, wherein the target is a viral protein, a bacterial protein or a component of a bacterial cell wall, a yeast or fungal protein or a component of a yeast or fungal cell wall, a protozoan protein, a toxin, a poison, venom, allergen, carcinogen, psychoactive drug, or an agent of a chemical weapon.

25. The particle of any one of claims 1-23, wherein the target is selected from TNFα, TNFβ, a soluble TNF receptor, soluble TNFR-1, soluble TNFR-2, lymphotoxin, lymphotoxin alpha, lymphotoxin beta, 4-1BB Ligand, CD30 Ligand, EDA-A1, LIGHT, TL1A, TWEAK, TRAIL, soluble TRAIL receptor, IL-1, soluble IL-1 receptor, IL-1A, soluble IL-1A receptor, IL-1B, soluble IL-1B receptor, IL-2, soluble IL-2 receptor, IL-5, soluble IL-5 receptor, IL-6, soluble IL-6 receptor, IL-8, IL-10, soluble IL-10 receptor, CXCL1, CXCL8, CXCL9, CXCL10, CX3CL1, FAS ligand, soluble death receptor-3, soluble death receptor-4, soluble death receptor-5, TNF-related weak inducer of apoptosis, MMP1, MMP2, MMP3, MMP9, MMP10, MMP12, CD28, a soluble member of the B7 family, soluble CD80/B7-1, soluble CD86/B7-2, soluble CTLA4, soluble PD-L1, soluble PD-1, soluble Tim3, Tim3L, galectin 3, galectin 9, soluble CEACAM1, soluble LAG3, TGF-β, TGF-β1, TGF-β2, TGF-β3, anti-müllerian hormone, artemin, glial cell-derived

neurotrophic factor, a bone morphogenic protein (*e.g.*, BMP2, BMP3, BMP3B, BMP4, BMP5, BMP6, BMP7, BMP8A, BMP8B, BMP10, BMP 11, BMP 12, BMP13, BMP15), a growth differentiation factor (*e.g.*, GDF1, GDF2, GDF3, GDF3A, GDF5, GDF6, GDF7, GDF8, GDF9, GDF10, GDF11, GDF15), inhibin alpha, inhibin beta (*e.g.*, inhibin beta A, B, C, E), lefty, nodal, neurturin, persephin, myostatin, ghrelin, sLR11, CCL2, CCL5, CCL11, CCL12, CCL19, interferon alpha, interferon beta, interferon gamma, clusterin, VEGF-A, granulocyte colony-stimulating factor (G-CSF), granulocyte-macrophage colony-stimulating factor (GM-CSF), prostaglandin E2, hepatocyte growth factor, nerve growth factor, sclerostin, complement C5, angiopoietin 2, angiopoietin 3, PCSK9, amyloid beta, activin, activin A, activin B, β2 microglobulin, soluble NOTCH1, soluble NOTCH2, soluble NOTCH3, soluble NOTCH4, haptoglobin, fibrinogen alpha chain, corticotropin releasing factor, corticotropin releasing factor type 1, corticotropin releasing factor type 2, urocortin 1, urocortin 2, urocortin 3, CD47, an anti-interferon γ autoantibody, an anti-interleukin 6 autoantibody, an anti-interleukin 17 autoantibody, an anti-ghrelin autoantibody, wnt, indoleamine 2,3-dioxygenase, C-reactive protein, and HIV-1 gp120.

26. The particle of claim 25, wherein the target is soluble PD-1 or soluble PD-L1.

27. The particle of any one of claims 1-26, wherein the target is a soluble biomolecule.

28. The particle of any one of claims 1-27, wherein:
the target is a soluble biomolecule;
the soluble biomolecule is a form of a cell surface receptor protein; and
(i) the coating sterically inhibits the agent from binding or activating the cell surface receptor protein on the surface of a cell, or
(ii) the plurality of protecting subparticles inhibits the agent from binding or activating the cell surface receptor protein on the surface of a cell.

29. A particle having at least one surface and an agent immobilized on the surface, wherein:
the agent selectively binds to a soluble biomolecule;
the soluble biomolecule is a form of a cell surface receptor protein; and

(i) the particle comprises a coating, wherein the coating sterically inhibits the agent from binding or activating the cell surface receptor protein on the surface of a cell, or

(ii) the particle comprises a core subparticle and a plurality of protecting subparticles;

the agent is immobilized on the core subparticle; and

the plurality of protecting subparticles sterically inhibits the agent from binding or activating the cell surface receptor protein on the surface of a cell.

30. The particle of any one of claims 1-29, wherein the agent is a small molecule, a macrocycle compound, a polypeptide, a protein, a peptide, a peptidomimetic compound, an antibody, a biomolecule-binding fragment of an antibody, a non-antibody scaffold protein, an aptamer, a nucleic acid, or a nucleic acid analog.

31. The particle of any one of claims 1-30, wherein the agent comprises:

(i) an antibody or a biomolecule-binding fragment of an antibody,

(ii) a non-antibody scaffold protein,

(iii) a nucleic acid or an aptamer,

(iv) an interleukin protein or variant thereof,

(v) a tumor necrosis factor (TNF) family ligand or a variant thereof,

(vi) a cytokine or a chemokine,

(vii) an enzyme,

(viii) a cell surface receptor protein;

(ix) a ligand of a cell surface receptor protein; or

(viii) a natural ligand of the target.

32. The particle of any one of claims 1-30, wherein the agent comprises

(i) an antibody or an antigen-binding portion of an antibody that specifically binds to PD-1 or PD-L1, or

(ii) PD1 or ligand of PD1.

33. The particle of any one of claims 1-30, wherein the agent comprises nivolumab, pidilizumab or pembrolizumab.

34. The particle of any one of claims 1-30, wherein the agent

(i) is a biomolecule-binding fragment of an antibody, wherein the biomolecule-binding fragment is selected from a Fab fragment, a $F(ab)_2$ fragment, an scFv fragment, and a domain antibody;

(ii) is the Z domain of *S. aureus* protein A, human transferrin, human tenth fibronectin type III domain, kunitz domain of a human trypsin inhibitor, human CTLA-4, an ankyrin repeat protein, a human lipocalin, human crystallin, human ubiquitin, or a trypsin inhibitor from *E. elaterium*;

(iii) is an IL-2 protein or variant thereof;

(iv) comprises a tumor necrosis factor (TNF) family ligand, wherein the TNF family ligand is TNFα or a variant thereof or is selected from Fas ligand, lymphotoxin, lymphotoxin alpha, lymphotoxin beta, 4-IBB Ligand, CD30 Ligand, EDA-Al, LIGHT, TLA1, TWEAK, TNF, TRAIL, and a variant of any of the foregoing; or

(v) is an aptamer.

35. The particle of any one of claims 1-30, wherein the agent is a ligand of a cell surface receptor protein.

36. The particle of claim 35, wherein the agent is a natural ligand of the cell surface receptor protein.

37. The particle of claim 35 or 36, wherein the cell surface receptor protein is expressed by a cancer cell.

38. The particle of any one of claims 35-37, wherein the cell surface receptor protein is a protein shed by a cancer cell as a soluble form of the cell surface receptor protein.

39. The particle of any one of claims 35-38, wherein the cell surface receptor protein, when activated on a cell surface, induces apoptosis.

40. The particle of any one of claims 35-39, wherein the cell surface receptor protein is a tumor necrosis factor receptor (TNFR) protein.

41. The particle of any one of claims 1-40, wherein the longest average dimension of the particle is no greater than 300 nm.

42. Use of the particle of any one of claims 1-41 in the manufacture of a medicament for treating a subject afflicted with cancer, an autoimmune disease, a neurodegenerative disease, a metabolic disorder, or for promoting healthy aging or increasing muscle mass in a subject.

43. The particle of any one of claims 1-41 for use in therapy.