WHAT IS CLAIMED IS:

1. A non-resorbable dermal filler comprising decellularized plant or fungal tissue from which cellular materials and nucleic acids of the tissue are removed, wherein the decellularized plant or fungal tissue is disassembled into particles having a size, diameter, or minimum feret diameter of at least about 20 μm.

2. The dermal filler of claim 1, wherein the decellularized plant or fungal tissue is chitin-based, chitosan-based, lignocellulosic-based, or cellulose-based; preferably wherein the decellularized plant or fungal tissue is derived from leafy structure, root, flesh, hypanthium or pulp structures of a plant; preferably wherein the decellularized plant or fungal tissue is derived from lettuce, carrot, apple, or pear, or any combination thereof.

3. The dermal filler of claim 1 or 2, wherein the decellularized plant or fungal tissue is homogenized; preferably wherein the decellularized plant or fungal tissue is dried, subjected to grinding, and optionally reconstituted or rehydrated; preferably wherein the decellularized plant or fungal tissue is disassembled into particles the size of single structural cells, or smaller.

4. The dermal filler of any one of claims 1-3, wherein the dermal filler further comprises a hydrogel, matrix, or carrier fluid for the decellularized plant or fungal tissue; preferably wherein the hydrogel, matrix, or carrier fluid comprises PBS, saline, hyaluronic acid (cross-linked or non-crosslinked), alginate, collagen, pluronic acid (e.g. pluronic F 127), agar, agarose, fibrin, calcium hydroxyapatite, Poly-L-lactic acid, autologous fat, silicone, dextran, methylcellulose, dissolved regenerated cellulose, or any combinations thereof.

5. The dermal filler of any one of claims 1-4, wherein the dermal filler is dried, or hydrated; preferably wherein the dermal filler comprises lidocaine or other anesthetic.

6. The dermal filler of any one of claims 1-5, wherein the decellularized plant or fungal tissue is disassembled into particles having irregular 3D shapes and/or which are non-spherical, thin, flake-like structures; preferably wherein the flake-like structures have a thickness of 0.01 to 100 μm, for example 0.1 μm; or wherein the decellularized plant or fungal tissue is disassembled into particles having a size sufficiently large so as not to be phagocytosed by a cell or cells; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a size, diameter, or feret diameter within a range of 20 μm to 1000 μm; preferably wherein the decellularized plant or fungal

tissue is disassembled into particles having a size, diameter, or maximum feret diameter of less than 200 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a size, diameter, or feret diameter distribution within a range of 20 μm to 200 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a particle size, diameter, or feret diameter distribution having a peak within 30 μm to 100 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a mean particle size, diameter, or feret diameter within a range of 30 μm to 100 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a size, diameter, or maximum feret diameter of less than 300 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a size, diameter, or feret diameter distribution within a range of 100 μm to 300 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a particle size, diameter, or feret diameter distribution having a peak within 100 μm to 300 μm; preferably wherein the decellularized plant or fungal tissue is disassembled into particles having a mean particle size, diameter, or feret diameter within a range of 100 μm to 300 μm.

7. The dermal filler of any one of claims 1-6, wherein the decellularized plant or fungal tissue is disassembled into particles having an average projected particle area within a range of 200 to 3000 μm^2 , or within a range of 200 to 300 μm^2; wherein the decellularized plant or fungal tissue is disassembled into particles having a surface area to volume ratio of 0.1 to 100 μm^{-1}; wherein the decellularized plant or fungal tissue is disassembled into particles having a packing density of 4 x 10^5 particles/mL to 7 x 10^9 particles/mL; or any combinations thereof; preferably wherein the dermal filler, decellularized plant or fungal tissue is sterilized; preferably wherein the sterilization is by gamma sterilization; preferably wherein the sterilization is by autoclaving; preferably wherein the sterilization is by ethanol treatment; preferably wherein the sterilization comprises a plurality of sterilization steps; preferably wherein a first sterilization step comprises a heat treatment; preferably wherein the dermal filler has a viscosity of less than 500,000 cp; preferably wherein the dermal filler has a viscosity within a range of 100,000 cp to 200,000 cp, preferably wherein the decellularized plant or fungal tissue is mercerized by heating with sodium hydroxide and hydrogen peroxide.

8. The dermal filler of any one of claims 1-7, wherein the decellularized plant or fungal tissue is mercerized.

9. The dermal filler of any one of claims 1-8, wherein the dermal filler is formulated for subdermal injection, deep dermal injection, subcutaneous injection (e.g. subcutaneous fat injection), or any

combinations thereof, preferably wherein the dermal filler is provided in a syringe or injection device.

10. The dermal filler of any one of claims 1-9 for use as as a soft tissue filler, for reconstructive surgery, or both; preferably for improving cosmetic appearance of a subject in need thereof; preferably for increasing tissue volume, smoothing wrinkles, or both, in a subject in need thereof.

11. A cosmetic method for improving cosmetic appearance, increasing tissue volume, smoothing wrinkles, or any combinations thereof, in a subject in need thereof, wherein the dermal filler as defined in any one of claims 1-9 is to be administered or injected to a region in need thereof for improving cosmetic appearance, increasing tissue volume, smoothing wrinkles, or any combinations thereof, of the subject.

12. The dermal filler of claim 10, or the method of claim 11, wherein native cells of the subject infiltrate the dermal filler; preferably wherein the dermal filler is non-resorbable such that the decellularized plant or fungal tissue remains substantially intact within the subject; preferably wherein the dermal filler is degradable through the addition of one or more enzymes thereto; preferably wherein the plant or fungal tissue is cellulose-based, and the one or more enzymes comprise cellulase; preferably wherein the cellulase is cellulase from *Trichoderma sp*.

13. A method for preparing a non-resorbable dermal filler, comprising:

providing a plant or fungal tissue;

decellularizing and size-reducing the plant or fungal tissue to provide particles from which cellular materials and nucleic acids of the tissue are removed; and

optionally, sterilizing the particles;

thereby providing the non-resorbable dermal filler wherein the decellularized plant or fungal tissue is disassembled into particles, wherein the size reducing provides particles having a size, diameter, or minimum feret diameter of at least about 20 μm.

14. The method of claim 13, wherein the decellularized plant or fungal tissue is chitin-based, chitosan-based, lignocellulosic-based, or cellulose-based; preferably wherein the decellularized plant or fungal tissue is derived from leafy structure, root, flesh, hypanthium or pulp structures of a plant; preferably wherein the decellularized plant or fungal tissue is derived from lettuce, carrot, apple, or

pear, or any combination thereof.

15. The method of claim 13 or 14, wherein the size-reducing comprises a mechanical size reduction to provide the particles, optionally where the mechanical size reduction is performed on dried, lyophilized, or freeze-dried materials; preferably wherein the mechanical size reduction comprises crushing, extrusion, grinding, milling, ultrasonication, electrospinning, or shearing the plant or fungal tissue, before or after decellularizing, to provide the particles, preferably wherein size-reducing comprises drying the plant or fungal tissue, before or after decellularizing; subjecting the dried plant or fungal tissue to mechanical size reduction to provide the particles; and, optionally, reconstituting, resuspending, or rehydrating the particles; preferably wherein the size-reducing provides particles the size of single structural cells, or smaller.

16. The method of claim 13 or 14 wherein the size-reducing comprises chemical dissolution or enzymatic breakdown, optionally performed on dried, lyophilized, or freeze-dried materials, before or after decellularizing, to provide the particles, preferably wherein size-reducing comprises drying the plant or fungal tissue, before or after decellularizing; subjecting the dried plant or fungal tissue to size reduction to provide the particles; and, optionally, reconstituting, resuspending, or rehydrating the particles; preferably wherein the size-reducing provides particles the size of single structural cells, or smaller.

17. The method of any one of claims 13-15, further comprising a step of formulating the particles with a hydrogel, matrix, or carrier fluid; preferably wherein the hydrogel, matrix, or carrier fluid comprises PBS, saline, hyaluronic acid (cross-linked or non-crosslinked), alginate, collagen, pluronic acid (e.g. Pluronic F 127), agar, agarose, fibrin, calcium hydroxyapatite, Poly-L-lactic acid, autologous fat, silicone, dextran, methylcellulose, regenerated cellulose, or any combinations thereof; preferably wherein the dermal filler is provided in dried, or hydrated, form; preferably wherein the method further comprises a step of formulating with lidocaine or other anesthetic.

18. The method of any one of claims 13-16, wherein the size-reducing provides particles having irregular 3D shapes and/or which are non-spherical, thin, flake-like structures; preferably wherein the flake-like structures have a thickness of 0.01 to 100 μm, for example 0.1 μm; preferably wherein the size-reducing further comprises performing extrusion, filtering, centrifuging, or other size separation to obtain particles having a target size, particles within a target size range, or particles having a target size distribution; preferably wherein the size-reducing provides particles having a size

sufficiently large so as not to be phagocytosed by a cell or cells.

19. The method of any one of claims 13-17, wherein the size-reducing provides particles having a size, diameter, or feret diameter within a range of 20 μm to 1000 μm; preferably wherein the size-reducing provides particles having a size, diameter, or maximum feret diameter of less than 200 μm; preferably wherein the size-reducing provides particles having a size, diameter, or feret diameter distribution within a range of 20 μm to 200 μm; preferably wherein the size-reducing provides particles having a particle size, diameter, or feret diameter distribution having a peak within 30 μm to 100 μm; preferably wherein the size-reducing provides particles having a mean particle size, diameter, or feret diameter within a range of 30 μm to 100 μm; preferably wherein the size-reducing provides particles having a size, diameter, or maximum feret diameter of less than 300 μm; preferably wherein the size-reducing provides particles having a size, diameter, or feret diameter distribution within a range of 100 μm to 300 μm; preferably wherein the size-reducing provides particles having a particle size, diameter, or feret diameter distribution having a peak within 100 μm to 300 μm; preferably wherein the size-reducing provides particles having a mean particle size, diameter, or feret diameter within a range of 100 μm to 300 μm.

20. The method of any one of claims 13-18, wherein the size-reducing provides particles having an average projected particle area within a range of 200 to 3000 μm^2 , or within a range of 200 to 300 μm^2; wherein the decellularized plant or fungal tissue is disassembled into particles having a surface area to volume ratio of 0.1 to 100 μm^{-1}; wherein the decellularized plant or fungal tissue is disassembled into particles having a packing density of 4×10^5 particles/mL to 7×10^9 particles/mL; or any combinations thereof; preferably wherein the size-reducing comprises grinding while simultaneously passing resulting particles through a filter to obtain particles below an upper threshold size; preferably the method further comprises filtering, differential or equilibrium centrifugation, or sieving to remove particles below a lower threshold size, obtaining particles above the lower threshold size; preferably wherein the filtering or sieving is performed using an automated wet-sieve; preferably wherein the size-reducing comprises performing differential or equilibrium centrifugation to obtain particles having a target size, particles within a target size range, or particles having a target size distribution.

21. The method of any one of claims 13-19, further comprising formulating the particles with a hydrogel, matrix, or carrier fluid by loading a first syringe or vessel with the particles in a fluid such as water or buffer (e.g. saline) and loading a second syringe or vessel with the hydrogel, matrix, or

carrier fluid; the first and second syringes or vessels being in fluid communication; and mixing by passing the contents of the syringes or vessels back and forth between the first and second syringes or vessels; preferably wherein the method further comprises formulating the particles with a hydrogel, matrix, or carrier fluid by mixing the particles with the hydrogel, matrix, or carrier fluid using a size exclusion mixer; preferably wherein the size exclusion mixer is a static mixer.

22. The method of any one of claims 13-20, wherein the method further comprises sterilizing the plant or fungal tissue, before or after decellularizing; preferably wherein the method further comprises sterilizing the dermal filler; preferably wherein the sterilization is by gamma sterilization; preferably wherein the sterilization is by autoclaving; preferably wherein the sterilization comprises a plurality of sterilization steps; preferably wherein a first sterilization step comprises a heat treatment.

23. The method of any one of claims 13-21, wherein the method further comprises treating the plant or fungal tissue; preferably wherein the treating step is performed after the decellularizing step; preferably wherein the treating comprises treatment of the decellularized plant or fungal tissue with a base and a peroxide; preferably wherein the base is a hydroxide base; preferably wherein the peroxide is hydrogen peroxide; preferably wherein the treating comprises mercerization of the decellularized plant or fungal tissue with an aqueous sodium hydroxide solution and hydrogen peroxide while heating; preferably wherein the treatment comprises mercerizing the decellularized plant or fungal tissue.

24. The method of any one of claims 13-22, wherein the decellularized plant or fungal tissue is treated with the aqueous sodium hydroxide solution for a first period of time before the hydrogen peroxide is added to the reaction; preferably wherein the peroxide is a 30% to 50% aqueous hydrogen peroxide stock solution; preferably wherein the aqueous hydrogen peroxide stock solution is used in an amount of at least about 75 mL per 500 g of decellularized plant or fungal tissue; preferably wherein, after addition of the aqueous hydrogen peroxide stock solution, the concentration of peroxide of a mixture of the decellularized plant or fungal tissue, the base, and the aqueous hydrogen peroxide stock solution is 1% to 5%; preferably wherein the base is a 1M sodium hydroxide solution; preferably wherein the 1M sodium hydroxide solution is used in an amount of 2500 mL per 500 g of decellularized plant or fungal tissue; preferably wherein the 1M sodium hydroxide solution is used in an amount of 2500 mL per 500 g of decellularized plant or fungal tissue.

25. The method of any one of claims 13-23, further comprising neutralizing the pH with one or more neutralization treatments; preferably wherein the one or more neutralization steps comprise treatment with an aqueous HCl solution; preferably wherein the mercerizing is performed with heating to 80°C; preferably wherein the mercerizing is performed for at least 30 minutes; preferably wherein the method further comprises formulating the dermal filler for subdermal injection, deep dermal injection, subcutaneous injection (e.g. subcutaneous fat injection), or any combinations thereof.

26. A kit comprising a dermal filler as defined in any one of claims 1-9, and any one or more of:

a hydrogel, matrix, or carrier fluid;

PBS, saline, hyaluronic acid (cross-linked or non-crosslinked), alginate, collagen, pluronic acid (e.g. pluronic F 127), agar, agarose, fibrin, calcium hydroxyapatite, Poly-L-lactic acid, autologous fat, silicone, dextran, methylcellulose, dissolved regenerated cellulose, or any combinations thereof;

lidocaine or other anesthetic;

one or more syringes, or another injection device;

a leur-lock fitting or coupler for two or more syringes;

one or more decellularization reagents;

one or more containers, packages, or vessels;

one or more buffers, water, or saline for injection;

a reagent or enzyme (e.g. cellulase) for dissolving dermal filler at an undesirable region or location;

or any combinations thereof.