In the claims:

1. A radiation-treated, concrete reinforcement fiber, comprising:

a concrete reinforcement fiber, comprising monofilaments, having a surface, and selected from the group consisting of polymer fiber, aramid fiber and blends or mixtures thereof; and

a modification ~~to~~ on the surface formed by exposure to electromagnetic energy and/or electron-beam radiation to form a radiation-modified, concrete reinforcement fiber, the modification selected from the group consisting of deformation, abrasion, roughness, asperity, porosity, and combinations thereof,

wherein the radiation-modified, concrete reinforcement fiber has one or more of a higher modulus, higher tensile strength and greater surface area than the modulus, tensile strength and surface area of a concrete reinforcement fiber without the modification, and

wherein the radiation-modified, concrete reinforcement fiber is incorporated into a mixture or blend of concrete prior to the concrete being set or field placed.

2. The radiation-treated, concrete reinforcement fiber of claim 1, wherein the electromagnetic energy comprises gamma rays.

3. The radiation-treated, concrete reinforcement fiber of claim 1, wherein the concrete reinforcement fiber is ~~composed of a material~~ selected from the group consisting of aramid fiber, polyolefin fiber and blends and mixtures thereof.

~~4. The fiber of claim 1, wherein the fiber is a monofilament fiber.~~

~~5~~4. The radiation-treated, concrete reinforcement fiber of claim 1, wherein the modification comprises an abraded surface.

~~6~~5. The radiation-treated, concrete reinforcement fiber of claim 1, wherein the modification comprises a porous surface.

6. The radiation-treated, concrete reinforcement fiber of claim 1, wherein the electromagnetic energy and/or electron-beam radiation constitutes a dose of 5 kGy to less than 35 kGy of radiation.

7. The radiation-treated, concrete reinforcement fiber of claim 1, wherein the electromagnetic energy and/or electron-beam radiation constitutes a dose of 5 kGy of radiation.

~~7~~8. A method of treating a concrete reinforcement fiber, comprising:

obtaining a concrete reinforcement fiber, comprising monofilaments, having a surface, and selected from the group consisting of polymer fiber, aramid fiber and blends or mixtures thereof;

modifying the surface by exposing the concrete reinforcement fiber to a radiation source selected from electromagnetic energy and electron-beam radiation; ~~and~~

forming a ~~radiation-treated~~ radiation-modified concrete reinforcement fiber having a ~~modified or deformed~~modification to the surface as compared to reinforcement fiber without a radiation treatment, the modification selected from the group consisting of deformation, abrasion, roughness, asperity, porosity, and combinations thereof, and

incorporating the radiation-modified concrete reinforcement fiber into a mixture or blend of concrete prior to the concrete being set or field placed.

~~8~~9. A reinforced asphalt or portland cement concrete composition, comprising:

a plurality of radiation-treated concrete reinforcement fibers, comprising:

concrete reinforcement fibers, comprising monofilaments, having a surface, and selected from the group consisting of polymer fiber, aramid fiber and blends or mixtures thereof; and

a modification to the surface formed by exposure to electromagnetic energy and/or electron-beam radiation, the modification selected from the group consisting of deformation, abrasion, roughness, asperity, porosity, and combinations thereof;

aggregate; and

binder,

wherein the plurality of radiation-treated, concrete reinforcement fibers have one or more of a higher modulus, higher tensile strength and greater surface area than the modulus, tensile strength and surface area of concrete reinforcement fibers without the modification.

~~9~~10. A reinforced grout composition, comprising:

a plurality of radiation-treated reinforcement fibers, comprising:

a surface; and

a modification to the surface formed by exposure to electromagnetic energy and/or electron-beam radiation, the modification selected from the group consisting of deformation, abrasion, roughness, asperity, porosity, and combinations thereof; and

dry grout material or blend,

wherein the plurality of radiation-treated, concrete reinforcement fibers have one or more of a higher modulus, higher tensile strength and greater surface area than the modulus, tensile strength and surface area of concrete reinforcement fibers without the modification.

~~10~~11. The grout composition of claim ~~9~~10, wherein the dry grout material or blend is selected from the group consisting of cement, bentonite clay and mixtures thereof.