

CLAIMS

1. A resin-composition which is curable and polymerizable by electromagnetic radiation, said composition comprising:
- 5 one or more polymerizable and/or crosslinkable organic compounds;
a photoinitiator comprising an iodonium salt;
one or more photosensitizer;
a copper-complex;
a butanediol and its derivatives;
- 10 a pinacol and its derivatives;
one or more redox or photochemical rearrangement organic compounds; and
one or more diluents.
2. The resin-composition according to claim 1, wherein the composition comprises:
- 15 50 – 90% of the one or more polymerizable and/or crosslinkable organic compounds;
0.3 – 1.5% of the photoinitiator;
0.2 – 6.5% of the one or more photosensitizer;
0.01 – 5.0% of the copper-complex;
0.01 – 5.0% butanediol and its derivatives;
- 20 0.01 – 5.0% pinacol and its derivatives;
0.1 – 0.5% of one or more redox or photochemical rearrangement organic compound; and
5 - 45% of the one or more diluents.
3. The resin-composition according to claim 1 or 2, wherein the at least one polymerizable
- 25 and/or crosslinkable organic compound is selected from compounds of trimethylolpropane-triacrylate and oxybis(methyl-2,1-ethandiyl)diacrylate, BPA epoxy resins such as liquid, semi-solid and solid bisphenol A epoxy resin, novalac epoxy resin, halogenated and non-halogenated epoxy resins, cardanol based epoxy resin, cycloaliphatic epoxy resin, sorbitol based epoxy resin, bio epoxy resins, bisphenol F epoxy resins.
- 30 4. The resin-composition according to any one of the preceding claims, wherein the iodonium salt is selected from Iodonium, diphenyl- 4,4'-di-C10-13-alkyl derivatives, tetrakis (2,3,4,5,6-pentafluorophenyl) borates and (4-(1-methylethyl)phenyl)-(4-methylphenyl)Iodonium tetrakis(pentafluorophenyl)borate(1-).

5. The resin-composition according to any one of the preceding claims, wherein the one or more photosensitizers are selected from camphorquinone, anthracene, such as 9,10-dibutoxyanthracene, ethoxynaphthalene, such as 1,4-diethoxynaphthalene.
- 5 6. The resin-composition according to any one of the preceding claims, wherein the copper-complex is selected from copper naphthanate, copper benzoate, copper sulfate, copper tetra fluoro borate, copper carbonate.
7. The resin-composition according to any one of the preceding claims, wherein the one or
10 more redox or photochemical rearrangement organic compound is selected from butanediol and its derivatives, pinacol and its derivatives, ascorbic acid, 2,3-dimethyl 2,3-butanediol, 4,4 diphenylcyclohexadienone.
8. The resin-composition according to any one of the preceding claims, wherein the composi-
15 tion is polymerizable by electromagnetic radiation from an emitter, emitting light in the range from 360 to 700 nm, preferably emitting light in the range from 380 to 480 nm, and preferably the composition after curing has a volume shrinkage of less the 5%, such as less than 3%, such as less than 2%.
- 20 9. A resin-composition which is curable and polymerizable by electromagnetic radiation, said composition comprising:
one or more polymerizable and/or crosslinkable organic compounds;
a photoinitiator comprising an iodonium salt;
one or more photosensitizer;
25 a butanediol and its derivatives;
a pinacol and its derivatives;
one or more redox or photo chemical rearrangement organic compounds;
wherein the resin-composition after cure has a volume shrinkage of less the 5%, such as less than 3%, such as less than 2%.
- 30 10. A method for curing a liner comprising the steps of:
providing a resin-composition according to any one of claims 1 to 10;
impregnating the liner with the resin-composition;

curing the resin-composition using light in the range 360 to 700 nm such as 380 to 480 nm, the liner preferably being felt or fiber reinforced, the fibers preferably being polymer fibers, glass fibers, carbonfibers, natural fibers or basalt.

- 5 11. The method according to claim 10, wherein said method comprising the steps:
- a: providing a resin-composition comprising a photo initiator selected from Iodonium, diphenyl-4,4'-di-C10-13alkyl derivatives, tetrakis (2,3,4,5,6-pentafluorophenyl) borates and (4-(1-methylethyl)phenyl)-(4-methylphenyl)Iodonium tetrakis(pentafluorophenyl)borate(1-) and camphorquinone, pinacol and anthracene as sensitizers;
- 10 b: adding solvent selected from ether or alcohol to the mixture;
- c: stirring till the mixture is dissolved in the solvent;
 - d: adding solid epoxy resin, cycloaliphatic epoxy resin, bisphenol A glycidyl ether resin, bisphenol F glycidyl ether resin and epoxy diluents to obtain the curable composition along with propoxylated glyceryl triacrylate.
- 15 12. The method according to claim 10 or 11 comprising the further step of adding ascorbic acid to the mixture before step b, and preferably the method comprising during step d adding at least one further component selected from polyester acrylates, epoxy acrylate, polyurethane acrylate, and/or polyether acrylate, and preferably the method comprising the further step of
- 20 adding tetramethylethylene glycol, propoxylated glyceryl triacrylate and copper salt or copper complex during step d.
13. The method according to any one of the claims 10 to 12 comprising, during step d, adding at least one further component selected from mono-, di- and/or tri- functional acrylate including
- 25 Acyl, aromatic, ether, dioxolane, carboxylic acid amide with acryloyl group and oxetane acrylate.
14. The method according to any one of the claims 10 to 13 comprising the further steps:
- e: applying the light curable resin-composition onto a fiber liner;
- 30 f: applying the light with wavelength of 360 to 700, preferable 380 to 480 nm, with intensity 0.001 W/cm² to 15 W/cm², preferable 0.01 W/cm² to 10 W/cm², to the surface of fiber liner with a speed of 3 to 200 m/h, preferably of 10 to 90 m/hr;
- g: allowing the fiber liner to cool down to room temperature.

15. Use of the resin-composition according to claim 1 for repairing and/or curing a pipe, pipe side connection, pipe fitting, manhole, tank, and other vertical or horizontal structures with the use of liner systems such as felt liner, glass liner and liners of other carrier materials including open foam, manufactured as a simple tube, hat-profiles, reinforcement materials, vertically and
- 5 horizontally, side connections, hat-profiles (top-hat), tee-hat and other fitting structures, or use of the resin-composition for outside wrapping of pipes, tanks and other structures with material selected from fiberglass, carbon fiber, basalt-fibers, polyester and other bendable organic and inorganic fibers, or use of the resin-composition according to claim 1 for repairing and/or building a composite construction for boat building, wind turbine blades and other composite structures,
- 10 or use of the resin-composition according to claim 1 with possibly added fillers or reinforcement in the form of glass fibers, carbon fibers, carbon nanotubes, inorganic fillers and other materials, for repair and/or coating and/or protection of surfaces of materials such as steel, concrete, clay, stone, plastics, rigid composites, rigid plastics and other rigid materials by the method of spray, roller, brush, dip and other application methods, or use in 3D printing
- 15 technology.