CLAIMS

1. Use of porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks for electromagnetic interference (EMI) shielding, wherein the carbon network is an intraparticle porous network wherein the carbon nanofibers are interconnected to other carbon nanofibers in the network by covalent bonds via junctions, wherein the pores in the network have an intraparticle pore diameter size of 5-150 nm using Mercury Intrusion Porosimetry according to ASTM D4404-10, wherein at least 20 wt% of the carbon in the carbon networks is in crystalline form, and the carbon nanofibers have an average aspect ratio of fibre length-to-thickness of at least 2.
2. Use according to claim 1, for EMI shielding in the frequency of 10 MHz – 40 GHz.
3. Use according to claim 1 or 2, wherein the networks are incorporated in a thermoplastic, elastomeric and/or thermoset polymer matrix in an EMI shielding assembly, to obtain an assembly having a shielding effectiveness of at least 20 dB, preferably 20 – 100 dB, more preferably 30 – 100 dB, more preferably 40 - 100 dB, even more preferably 40 - 80 dB at frequencies between 10 MHz and 40GHz according to IEEE299 on the outer surface of the assembly.
4. Use according to claim 3, wherein the assembly comprises at least 15 wt%, preferably at least 20 wt%, more preferably 20 – 80 wt% of porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks based on the total assembly weight.
5. Use according to claim 3, wherein the assembly comprises porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks together with one or more EMI shielding agents selected from carbon nanotubes (CNT), carbon fibres (CF), glass fibres (GF), steel fibres (SF) and porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks, wherein at least 15 wt%, more preferably at least 20 wt%, preferably 30 – 80 wt% of the sum of all shielding agent(s), the number based on the weight of the assembly, and wherein the amount of porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks is at least 1 wt%, more preferably at least 5 wt%, more preferably at least 10 wt%, most preferably 10 – 50 wt% of the assembly.
6. Use according to any one of claim 3 - 5, wherein the assembly is a housing assembly for an electric vehicle, a seal for an electrical vehicle, a battery casing for an energy source, radar shield or medical diagnostic shield.
7. Use according to any one of claims 3 – 6, wherein the assembly has a volume resistivity of 0.01 – 1000 ohm.cm, preferably 0.1 – 500 ohm.cm.
8. Use according to any one of claims 3 – 7, wherein the tensile strength of the assembly is maintained or improved, preferably at a tensile strength value of 100 – 200 % compared to the tensile strength of the corresponding assembly without the networks, preferably at a tensile strength value of at least 105%, more preferably at least 120%, -100 %, most preferably 120%-170% of the tensile strength of the corresponding assembly without the networks; and/or

wherein the assembly has a stiffness which is 10%-300% higher, preferably 50 – 200% higher than the stiffness for the corresponding assembly without the networks.

9. A EMI shielding composite assembly comprising a thermoplastic, elastomeric and/or thermoset polymer matrix and at least 15 wt%, preferably at least 20 wt%, more preferably 20 – 80 wt% of porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks based on the total assembly weight, wherein the carbon network is an intraparticle porous network wherein the carbon nanofibers are interconnected to other carbon nanofibers in the network by covalent bonds via junctions, wherein the pores in the network have an intraparticle pore diameter size of 5-150 nm using Mercury Intrusion Porosimetry according to ASTM D4404-10, wherein at least 20 wt% of the carbon in the carbon networks is in crystalline form, and the carbon nanofibers have an average aspect ratio of fibre length-to-thickness of at least 2,
   the assembly having an electromagnetic shielding effectiveness of at least 20 dB, preferably 20 – 100 dB, more preferably 30 – 100 dB, more preferably 40 - 100 dB, even more preferably 40 - 80 dB at frequencies between 10 MHz and 40GHz according to IEEE299 on the outer surface of the assembly.
10. A EMI shielding composite assembly comprising a thermoplastic, elastomeric and/or thermoset polymer matrix and one or more EMI shielding agents selected from carbon nanotubes (CNT), carbon fibres (CF), glass fibres (GF), steel fibres (SF) and porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks, wherein at least 15 wt%, more preferably at least 20 wt%, preferably 30 – 80 wt% of the sum of all shielding agent(s), the number based on the weight of the assembly, and wherein the amount of porous, covalently bonded, crystalline carbon-nanofibres comprising carbon networks is at least 1 wt%, more preferably at least 5 wt%, more preferably at least 10 wt%, most preferably 10 – 50 wt% of the assembly, wherein the carbon network is an intraparticle porous network wherein the carbon nanofibers are interconnected to other carbon nanofibers in the network by covalent bonds via junctions, wherein the pores in the network have an intraparticle pore diameter size of 5-150 nm using Mercury Intrusion Porosimetry according to ASTM D4404-10, wherein at least 20 wt% of the carbon in the carbon networks is in crystalline form, and the carbon nanofibers have an average aspect ratio of fibre length-to-thickness of at least 2,
    the assembly having an electromagnetic shielding effectiveness of at least 20 dB, preferably 20 – 100 dB, more preferably 30 – 100 dB, more preferably 40 - 100 dB, even more preferably 40 - 80 dB at frequencies between 10 MHz and 40GHz according to IEEE299 on the outer surface of the assembly.
11. The assembly according to any one of claims 9 - 10, having a volume resistivity of 0.01 – 1000 ohm.cm, preferably 0.1 – 500 ohm/cm.
12. The assembly according to any one of claims 9-11, wherein the assembly is for the automotive industry, telephone carrier applications, defence application, sensing devices, and medical industry.

13. The assembly according to any one of claims 9 - 12, wherein the assembly is a housing assembly for an electric vehicle, a seal for an electrical vehicle, a battery casing for an energy source, radar shield, medical diagnostic shield.
14. The assembly according to any one of claims 9 - 13, wherein the tensile strength is maintained or improved, preferably at a tensile strength value of 100 – 200 % compared to the tensile strength of the corresponding assembly without the networks, preferably at a tensile strength value of at least 105%, more preferably at least 120%, -100 %, most preferably 120%-170% of the tensile strength of the corresponding assembly without the networks; and/or wherein the assembly has a stiffness which is 10%-300% higher, preferably 50 – 200% higher than the stiffness for the corresponding assembly without the networks.
15. Use or assembly according to any one of the preceding claims, wherein the networks are obtainable by a process for the production of crystalline carbon networks in a reactor **3** which contains a reaction zone **3b** and a termination zone **3c,** by injecting a water-in-oil or bicontinuous micro-emulsion **c**, preferably a bicontinuous micro-emulsion **c**, said micro-emulsion comprising metal catalyst nanoparticles, into the reaction zone **3b** which is at a temperature of above 600 °C, preferably above 700 °C, more preferably above 900 °C, even more preferably above 1000 °C, more preferably above 1100 °C, preferably up to 3000 °C, more preferably up to 2500 °C, most preferably up to 2000 °C, to produce crystalline carbon networks **e**, transferring these networks **e** to the termination zone **3c**, and quenching or stopping the formation of crystalline carbon networks **e** in the termination zone by spraying in water **d**.
16. Use or assembly according to claim 15, wherein the reactor is a furnace carbon black reactor **3** which contains, along the axis of the reactor **3**, a combustion zone **3a**, a reaction zone **3b** and a termination zone **3c**, wherein the process for the production of crystalline carbon networks involves producing a stream of hot waste gas **a1** in the combustion zone by burning a fuel a in an oxygen-containing gas b and passing the waste gas **a1** from the combustion zone **3a** into the reaction zone **3b**, spraying a water-in-oil or bicontinuous micro-emulsion **c**, preferably a bicontinuous micro-emulsion **c**, said micro-emulsion comprising metal catalyst nanoparticles, in the reaction zone **3b** containing the hot waste gas, carbonizing said emulsion at a temperature of above 600 °C, preferably above 700 °C, more preferably above 900 °C, even more preferably above 1000 °C, more preferably above 1100 °C, preferably up to 3000 °C, more preferably up to 2500 °C, most preferably up to 2000 °C, and quenching or stopping the reaction in the termination zone **3c** by spraying in water **d**, to yield crystalline carbon networks **e**.