CLAIMS

1. A method of using a surface-treated calcium carbonate for water purification and/or dewatering of sludges and/or sediments, wherein at least 1 % of the accessible surface area of the calcium carbonate is covered by a coating comprising at least one cationic polymer wherein the surface-treated calcium carbonate comprises a surface-modified calcium carbonate that has been processed with cationic polymers through an additional treatment step,

wherein the surface-modified calcium carbonate is obtained by reacting a natural calcium carbonate and/or precipitated calcium carbonate with an acid and with carbon dioxide prior to the preparation of the surface-treated calcium carbonate, wherein the carbon dioxide is formed in situ by the acid treatment and/or is supplied from an external source

2. A method of using a surface-treated calcium carbonate for reducing the amount of polymeric flocculation aids in water and/or sludges and/or sediments, wherein at least 1 % of the accessible surface area of the calcium carbonate is covered by a coating comprising at least one cationic polymer.

3. The method according to claim 1, wherein the source of natural calcium carbonate (GCC) is selected from marble, chalk, calcite, dolomite, limestone and mixtures thereof and/or the precipitated calcium carbonate (PCC) is selected from one or more of the aragonitic, vateritic and calcitic mineralogical crystal forms.

4. The method according to any one of claims 1 to 3, wherein the calcium carbonate particles of the at least one surface-treated calcium carbonate has a weight median particle diameter d_{50} value of between 0.01 μm and 250 μm, preferably between 0.06 μm and 225 μm, more preferably between 1 μm and 200 μm, even more preferably between 1 μm and 150 μm and most preferably between 1 μm and 100 μm and/or the calcium carbonate particles of the surface-treated calcium carbonate has a specific surface area of from 1 to 250 m^2/g, more preferably from 2 to 200 m^2/g, even more preferably from 30 to 150 m^2/g and most preferably from 30 to 100 m^2/g.

5. The method according to any one of claims 1 to 4, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer having a positive charge density in the range of 1 mEq/g and 15 mEq/g, more preferably in the range of 2.5 mEq/g and 12.5 mEq/g and most preferably in the range of 5 mEq/g and 10 mEq/g and/or the coating of the surface-treated calcium carbonate comprises at least one cationic polymer in which at least 60 % of the monomer units have a cationic charge, preferably at least 70 %, more preferably at least 80 %, even more preferably at least 90 % and most preferably equal to 100 %.

6. The method according to any one of claims 1 to 5, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer having a weight average molecular weight M_w of below 1,000,000 g/mole, more preferably from 50,000 to 750,000 g/mole, even more preferably from 50,000 to 650,000 g/mole and most preferably from 100,000 to 300,000 g/mole.

7. The method according to any one of claims 1 to 6, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer being a homopolymer based on monomer units selected from the group consisting of diallyldialkyl ammonium salts; tertiary and quaternized amines; quaternized imines; acrylamide; methacrylamide; N,N-dimethyl acrylamide; acrylic acid; methacrylic acid; vinylsulfonic acid; vinyl pyrrolidone; hydroxyl ethyl acrylate; styrene; methyl methacrylate and vinyl acetate, preferably diallyldialkyl ammonium salts and acrylic acid.

8. The method according to any one of claims 1 to 6, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer being a copolymer based on monomer units selected from diallyldialkyl ammonium salts and methacrylic acid and comonomer units selected from the group consisting of acrylamide; methacrylamide; N,N-dimethyl acrylamide; acrylic acid; methacrylic acid; vinylsulfonic acid; vinyl pyrrolidone; hydroxyl ethyl acrylate; styrene; methyl methacrylate; vinyl acetate and mixtures thereof, preferably the monomer units are selected from diallyldialkyl ammonium salts and methacrylic acid and comonomer units selected from acrylamide and acrylic acid.

9. The method according to any one of claims 1 to 8, wherein at least 10 % of the accessible surface area of the calcium carbonate is covered by a coating comprising a cationic polymer, preferably at least 20 % of the accessible surface area, more preferably at least 30 %, even more preferably at least 40 % and most preferably at least 50 % of the accessible surface area.

10. The method according to any one of claims 1 to 9, wherein the surface-treated calcium carbonate is in powder form and/or in the form of granules or in the form of slurry.

11. The method according to any one of claims 1 to 10, wherein the surface-treated calcium carbonate is used in combination with at least one polymeric flocculation aid.

12. The method according to claim 11, wherein the polymeric flocculation aid has a weight average molecular weight M_w in the range from 100,000 to 10,000,000 g/mole, preferably in the range from 300,000 to 5,000,000 g/mole, more preferably in the range from 300,000 to 1,000,000 g/mole and most preferably in the range from 300,000 to 800,000 g/mole and/or the polymeric flocculation aid is non-ionic or ionic, preferbly a cationic or anionic polymer selected from polyacrylamides, polyacrylates, poly(diallyldimethylammonium chloride), polyethyleneimines, polyamines, starches and mixtures thereof.

CLAIMS

1. Use of a surface-treated calcium carbonate for water purification and/or dewatering of sludges and/or sediments, wherein at least 1 % of the accessible surface area of the calcium carbonate is covered by a coating comprising at least one cationic polymer, wherein the surface-treated calcium carbonate comprises surface-modified calcium carbonate that has been processed with cationic polymers through an additional treatment step, and
wherein the surface-modified calcium carbonate is obtained by reacting a natural calcium carbonate and/or precipitated calcium carbonate with an acid and with carbon dioxide prior to the preparation of the surface-treated calcium carbonate, wherein the carbon dioxide is formed in situ by the acid treatment and/or is supplied from an external source.

2. The use according to claim 1, wherein the calcium carbonate particles of the at least one surface-treated calcium carbonate has a weight median particle diameter d_{50} value of between 0.01 μm and 250 μm, preferably between 0.06 μm and 225 μm, more preferably between 1 μm and 200 μm, even more preferably between 1 μm and 150 μm and most preferably between 1 μm and 100 μm and/or the calcium carbonate particles of the surface-treated calcium carbonate has a specific surface area of from 1 to 250 m^2/g, more preferably from 2 to 200 m^2/g, even more preferably from 30 to 150 m^2/g and most preferably from 30 to 100 m^2/g.

3. The use according to any one of claims 1 or 2, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer having a positive charge density in the range of 1 mEq/g and 15 mEq/g, more preferably in the range of 2.5 mEq/g and 12.5 mEq/g and most preferably in the range of 5 mEq/g and 10 mEq/g and/or the coating of the surface-treated calcium carbonate comprises at least one cationic polymer in which at least 60 % of the monomer units have a cationic charge, preferably at least 70 %, more preferably at least 80 %, even more preferably at least 90 % and most preferably equal to 100 %.

4. The use according to any one of claims 1 to 3, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer having a weight average molecular weight M_w of below 1,000,000 g/mole, more preferably from 50,000 to 750,000 g/mole, even more preferably from 50,000 to 650,000 g/mole and most preferably from 100,000 to 300,000 g/mole.

5. The use according to any one of claims 1 to 4, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer being a homopolymer based on monomer units selected from the group consisting of diallyldialkyl ammonium salts; tertiary and quaternized amines; quaternized imines;, preferably diallyldialkyl ammonium salts.

6. The use according to any one of claims 1 to 4, wherein the coating of the surface-treated calcium carbonate comprises at least one cationic polymer being a copolymer based on monomer units selected from diallyldialkyl ammonium salts and comonomer units selected from the group consisting of acrylamide; methacrylamide; N,N-dimethyl acrylamide; acrylic acid; methacrylic acid; vinylsulfonic acid; vinyl pyrrolidone; hydroxyl ethyl acrylate; styrene; methyl methacrylate; vinyl acetate and mixtures thereof.

7. The use according to any one of claims 1 to 6, wherein at least 10 % of the accessible surface area of the calcium carbonate is covered by a coating comprising a cationic polymer, preferably at least 20 % of the accessible surface area, more preferably at least 30 %, even more preferably at least 40 % and most preferably at least 50 % of the accessible surface area.

8. The use according to any one of claims 1 to 7, wherein the surface-treated calcium carbonate is in powder form and/or in the form of granules or in the form of slurry.

9. The use according to any one of claims 1 to 8, wherein the surface-treated calcium carbonate is used in combination with at least one polymeric flocculation aid.

10. The use according to claim 9, wherein the polymeric flocculation aid has a weight average molecular weight M_w in the range from 100,000 to 10,000,000 g/mole, preferably in the range from 300,000 to 5,000,000 g/mole, more preferably in the range from 300,000 to 1,000,000 g/mole and most preferably in the range from 300,000 to 800,000 g/mole and/or the polymeric flocculation aid is non-ionic or ionic, preferably a cationic or anionic polymer selected from polyacrylamides, polyacrylates, poly(diallyldimethylammonium chloride), polyethyleneimines, polyamines, starches and mixtures thereof.