Claims:

1. A process for the preparation of an aqueous slurry comprising a plurality of copolymer particles suspended therein, the process comprising at least the steps of:

a) providing a reaction medium comprising an organic diluent, and at least two monomers whereby at least one monomer is an isoolefin and at least one monomer is a multiolefin;

b) polymerizing the monomers within the reaction medium in the presence of an initiator system to form a medium comprising the copolymer, the organic diluent and optionally residual monomers

c) contacting the medium obtained in step b) with an aqueous medium comprising at least one LCST compound having a cloud point of 0 to 100℃ and removing at least partially the organic diluent and to the extent present in the medium removing at least partially the residual monomers to obtain the aqueous slurry comprising the copolymer particles

whereby the aqueous medium contains 20,000 ppm or less of non-LCST compounds whereby the non-LCST compounds are

selected from the group consisting of ionic or non-ionic surfactants, emulsifiers, and antiagglomerants.

2. The process according to claim 1, wherein LCST compounds are those having a cloud point of 0 to 100℃ determined by at least one of the following methods:

- DIN EN 1890 of September 2006, method A
- DIN EN 1890 of September 2006, method C
- DIN EN 1890 of September 2006, method E
- DIN EN 1890 of September 2006, method A wherein the amount of compound tested is reduced from 1g per 100 ml of distilled water to 0.05 g per 100 ml of distilled water
- DIN EN 1890 of September 2006, method A wherein the amount of compound tested is reduced from 1g per 100 ml of distilled water to 0.2 g per 100 ml of distilled water.

3. The process according to claim 1 or 2, wherein the aqueous medium comprises additionally 500 ppm or less of non-LCST compounds whereby the non-LCST compounds are selected from those listed in claim 1.

4. The process according to one of claims 1 to 3, wherein the aqueous medium comprises additionally 550 ppm or less of salts of metal ions calculated on their metal content and with respect to the amount of copolymer present in the medium obtained according to step b).

5. The process according to one of claims 1 to 4, wherein the aqueous slurry comprises at least 10 discrete copolymer particles per liter suspended therein, preferably at least 20 discrete particles per liter, more preferably at least 50 discrete particles per liter and even more preferably at least 100 discrete particles per liter.

6. The process according to one of claims 1 to 5, wherein copolymer particles are discrete particles of any form and consistency having a particle size of between 0.05 mm and 25 mm.

7. The process according to one of claims 1 to 6, wherein the copolymer particles have a weight average particle size of from 0.3 to 10.0 mm.

8. The process according to one of claims 1 to 7, wherein the aqueous medium comprises of from 1 to 2,000 ppm of antioxidants calculated with respect to the amount of copolymer present in the medium obtained according to step b).

9. The process according to one of claims 1 to 8, wherein the at least one isoolefin is selected from the the group consisting of isoolefin monomers having from 4 to 16 carbon atoms.

10. The process according to one of claims 1 to 9, wherein the isoolefin is isobutene.

11. The process according to one of claims 1 to 10, wherein the at least one multiolefin is selected from the the group consisting of isoprene, butadiene, 2-methylbutadiene, 2,4-dimethylbutadiene, piperyline, 3-methyl-1,3-pentadiene, 2,4-hexadiene, 2-neopentylbutadiene, 2-methyl-1,5-hexadiene, 2,5-dimethyl-2,4-hexadiene, 2-methyl-1,4-pentadiene, 4-butyl-1,3-pentadiene, 2,3-dimethyl-1,3-pentadiene, 2,3-dibutyl-1,3-pentadiene, 2-ethyl-1,3-pentadiene, 2-ethyl-1,3-butadiene, 2-methyl-1,6-heptadiene, cyclopentadiene, methylcyclopentadiene, cyclohexadiene and 1-vinyl-cyclohexadiene.

12. The process according to one of claims 1 to 11, wherein the multiolefin is isoprene.

13. The process according to one of claims 1 to 12, wherein at least one further monomers is selected from the group consisting of β-pinene, styrene, divinylbenzene, diisopropenylbenzene o-, m- and p-alkylstyrenes.

14. The process according to one of claims 1 to 13, wherein the monomers employed in step a) comprise in the range of from 80 wt.-% to 99.5 wt.-% by weight of at least one isoolefin monomer and in the range of from 0.5 wt.-% to 20 wt.-% by weight of at least one multiolefin monomer based on the weight sum of all monomers employed.

15. The process according to one of claims 1 to 14, wherein the monomers comprise in the range of from 90 wt.-% to 95 wt.-% of at least one isoolefin monomer and in the range of from 5 wt.-% to 10 wt.-% by weight of a multiolefin monomer based on the weight sum of all monomers employed.

16. The process according to one of claims 1 to 15, wherein the monomers are present in the reaction medium in an amount of from 0.01 wt.-% to 80 wt.-%.

17. The process according to one of claims 1 to 16, wherein the organic diluents are hydrochlorocarbon(s) or hydrofluorocarbons represented by the formula: $C_xH_yF_z$ wherein x is an integer from 1 to 40, wherein y and z are integers and are at least one or hydrocarbons or mixtures of the aforementioned diluents.

18. The process according to one of claims 1 to 17, wherein the polymerization according to step b) is carried out either as slurry polymerization or solution polymerization.

19. The process according to one of claims 1 to 18, wherein step b) or step c) or both steps b) and c) are carried out continuously.

20. The process according to to one of claims 1 to 19, wherein the initiator comprises aluminium trichloride.

21. The process according to claim 20, wherein water and/or alcohols are used as proton source.

22. The process according to one of claims 1 to 21, wherein the temperature in step c) is from 10 to 100℃.

23. The process according to one of claims 1 to 22, wherein the at least one LCST compound is selected from the group consisting of:

poly(N-isopropylacrylamide), poly(N-isopropylacrylamide-co-N,N-dimethylacrylamide, poly(N-isopropylacrylamide)-alt-2-hydroxyethylmethacrylate, poly(N-vinylcaprolactam), poly(N,N-diethylacrylamide), poly[2-(dimethylamino)ethyl methacrylate], poly(2-oxazoline) glycopolymers, Poly(3-ethyl-N-vinyl-2-pyrrolidone), hydroxylbutyl chitosan, polyoxyethylene (20) sorbitan monostearate, polyoxyethylene (20) sorbitan monolaurate, polyoxyethylene (20) sorbitan monooleate, methyl cellulose, hydroxypropyl cellulose, hydroxyethyl methylcellulose, hydroxyethyl cellulose hydroxypropyl methylcellulose, poly(ethylene glycol) methacrylates with 2 to 6 ethylene glycol units, polyethyleneglycol-co-polypropylene glycols, compounds of formula (I)

(I) $HO-[-CH_2-CH_2-O]_x-[-CH(CH_3)-CH_2-O]_y-[-CH_2-CH_2-O]_z-H$

with y = 3 to 10 and x and z = 1 to 8, whereby y+x+z is from 5 to 18,

polyethyleneglycol-co-polypropylene glycol, ethoxylated iso-$C_{13}H_{27}$-alcohols, polyethylene glycol with 4 to 50 ethyleneglycol units, polypropylene glycol with 4 to 30 propyleneglycol units, polyethylene glycol monomethyl, dimethyl, monoethyl and diethyl ether with 4 to 50 ethyleneglycol units, polypropylene glycol monomethyl, dimethyl, monoethyl and diethyl ether with 4 to 50 propyleneglycol units.

24. The process according to one of claims 1 to 23, wherein the LCST compounds exhibit a molecular weight of at least 1,500 g/mol.

25. The process according to one of claims 1 to 24, comprising a further step d) wherein the copolymer particles contained in the aqueous slurry obtained according to step c) are separated to obtain isolated copolymer particles.

26. The process according to one of claims 1 to 25, comprising further step d) wherein the copolymer particles contained in the aqueous slurry obtained according to step c) are separated to obtain isolated copolymer particles and further step e) wherein the isolated copolymer particles are dried.

27. The process according to one of claims 1 to 26, comprising as a further step shaping of the copolymer particles to obtain reshaped copolymer particles.