CLAIMS

1. A method for preparing a polymer nanocomposite masterbatch, comprising the steps:

    a) dispersing a nano filler material in an organic solvent;

    b) contacting the nano filler material in the organic solvent with a surface functionalizing agent to form a surface functionalized nano filler material suspension;

    c) mixing the surface functionalized nano filler material suspension with a polymer solution to form a dissolved polymer nanocomposite masterbatch suspension;

    d) precipitating the dissolved polymer nanocomposite masterbatch suspension to produce a precipitation of polymer nanocomposite masterbatch;

    e) optionally, filtering and drying the precipitation of polymer nanocomposite masterbatch to form a polymer nanocomposite masterbatch.

2. The method according to claim 1, wherein the nano filler material is selected from the group consisting of minerals, inorganic fillers, organic fillers, metal oxides, natural fibers, synthetic fibers or a mixture thereof.

3. The method according to claim 1 or 2, wherein the nano filler material is selected from montmorillonite, smectite, kaolin, boulangerite, imogolite, layered silicate compound, organo clay modified with quaternary ammonium salt, silica, carbon black, cellulose fiber, nano cellulose fiber, talc, calcium carbonate, alumina or a mixture thereof.

4. The method according to any of the preceding claims, wherein the organic solvent is selected from xylene, toluene, hexane or dichlorobenzene.

5. The method according to any of the preceding claims, wherein the dispersing step comprising stirring the nano filler material in the organic solvent for 3 hours – 24 hours and/or sonicating for 20 – 60 minutes and/or homogenizing for 15 – 30 minutes and/or stirring for 12 - 24 hours.

6. The method according to any of the preceding claims, wherein the contacting step comprises homogenizing the nano filler material suspension for 15 – 30 minutes and/or adding the surface functionalizing agent and/or stirring for 2 - 6 hours at 80 – 100 ^{o}C

and/or homogenizing the resultant mixture for 15 – 30 minutes and/or stirring for 12 – 24 hours.

7. The method according to any of the preceding claims, wherein the surface functionalizing agent is selected from the group consisting of quaternary ammonium salts, silanes, titanates, organic acid, grafted oligomer or grafted polymer.

8. The method according to any of the preceding claims, wherein the surface functionalizing agent is in an amount in the range from 0.1 to 20 % by weight with respect to weight of the nano filler material.

9. The method according to any of the preceding claims, wherein the polymer solution is a solution of a polymer selected from polyolefins, preferably polyethylene, polypropylene, C4-C8 alpha-polyolefins base, copolymer thereof; polyolefin rubber; polyolefin oligomer; polyolefin wax; polyaramide; polyarylamide; polycarbonate; styrene acrylonitrile; acrylonitrile butadiene styrene; polyacetal; polysulfone; polyester, preferably polybutylene terephthalate, polyethylene terephthalate; thermoplastic polyurethane elastomer; polyphenylene sulfide; polyether sulfone; polyphenylene oxide; vinyl polymers, preferably polystyrene; polyvinyl chloride; polyacrylate; polyurethanes; polyetherimide; polyetheretherketone; polyetherketone; polymethylpentene; perfluoroalkoxy; ethylene tetrafluroethylene; polyvinylidene fluoride; fluorinated ethylene propylene; liquid crystal polymers; polyphthalamide; polyether, polysiloxane, thermoplastic polyimide; and polyamide.

10. The method according to any of the preceding claims, wherein the mixing step comprises mixing the surface functionalized nano filler material suspension into the polymer solution and stirring for 2 – 6 hours.

11. The method according to any of the preceding claims, further comprising the step of compounding the polymer nanocomposite masterbatch with a polymer to form a polymer nanocomposite.

12. A polymer nanocomposite masterbatch obtainable by the method according to any of the preceding claims.

13. The polymer nanocomposite masterbatch according to claim 12 comprising nano filler material in an amount in the range from 10 to 80 % by weight with respect to the total weight of the polymer nanocomposite masterbatch.

14. A method for preparing a polymer nanocomposite comprising a step of compounding the polymer nanocomposite masterbatch according to claim 12 or 13 or obtainable by the method according to any of the claims 1 to 11 with a polymer.

15. A polymer nanocomposite obtainable by the method according to claim 13.