CLAIMS

1. A process for the preparation of aziridine-functional polycarbodiimides comprising the steps of:

i) the reaction of polyisocyanates or a mixture of mono- and polyisocyanates at 80 - 200 °C in the presence of 0.02 - 5 weight percentage of a carbodiimide catalyst, in which an isocyanate functional polycarbodiimide, optionally in admixture with a polycarbodiimide, is formed with a mean value of 1 - 10 carbodiimide functions; and

ii) terminating and/or chain extending the isocyanate functional polycarbodiimide chain, during or after the formation of the polycarbodiimide chain, by the addition of 0.05 to 0.95 equivalent, regarding to the isocyanate functions that are not consumed in the formation of the polycarbodiimide chain, with a first compound containing a hydrophilic group and one or multiple amine and/or hydroxyl functions, together with, prior to, or followed by reacting the remaining isocyanate functions with one or multiple second compounds containing one or multiple amine and/or hydroxyl functions,

in which 0 to 60 weight% of an organic solvent and/or 0 to 50 weight% of a plasticizer, and/or 0 to 30 weight% of surface active component is added during, before or after the carbodiimide forming reaction and/or the terminating reaction and/or the chain extending reaction,

wherein at least one of the second compounds containing one or more amine and/or hydroxyl functions also contains one or multiple aziridine functional groups as additional functional group and is an ester of one or more 1-Aziridinealkanoic acid moieties.

2. A process according to claim 1, wherein the second compound containing one or more amine and/or hydroxyl functions and that also contains one or multiple aziridine functional groups as additional functional group has a molecular weight of above 300 Dalton, and preferably within the range from 350 Dalton to 900 Dalton.

3. A process according to claim 1 or 2, wherein the second compound containing one or more amine and/or hydroxyl functions and that also contains one or multiple aziridine functional groups as additional functional group is added in an amount calculated as 0.05 to 0.95 equivalent, regarding to the isocyanate functions that are not consumed in the formation of the polycarbodiimide chain.

4. A process according to claim 1 to 3, wherein the second compound containing one or multiple amine and/or hydroxyl functions and that also contains one or multiple aziridine functional groups contains two or more aziridine groups, and preferably between two and five aziridine groups.

5. A process according to claim 1 to 4, wherein the second compound containing one or multiple amine and/or hydroxyl functions and that also contains one or multiple aziridine functional groups belongs to the groups of 1-Aziridinealkanoic acid, 1,1'-[2-[[3-(1-aziridinyl)-1-oxoalkoxy]alkyl]-2-(hydroxyalkyl)-α,ω-alkanediyl] ester.

6. A process according to any of claims 1 to 4, wherein the second compound containing one or multiple amine and/or hydroxyl functions and that also contains one or multiple aziridine functional groups is selected from the group consisting of: 1-Aziridinepropanoic acid, 1,1'-[2-[[3-(1-aziridinyl)-1-oxopropoxy]methyl]-2-(hydroxymethyl)-1,3-propanediyl] ester; 1-Aziridineacetic acid, α-methyl-, 2-[[2-(1-aziridinyl)-1-oxopropoxy]methyl]-2-(hydroxymethyl)-1,3-propanediyl ester; 1-Aziridinepropanoic acid, 2-ethyl-, 2-[[3-(2-ethyl-1-aziridinyl)-1-oxopropoxy]methyl]-2(hydroxymethyl)-1,3-propanediyl ester; 1-Aziridinepropanoic acid, 2,2-dimethyl-, 2-[[3(2,2-dimethyl-1-aziridinyl)-1-oxopropoxy]ethyl]-2-(hydroxymethyl)-1,3-propanediyl ester; 1-Aziridinepropanoic acid, 2-methyl-, 1,1'-[2-(hydroxymethyl)-2-[[3-(2-methyl-1-aziridinyl)-1-oxopropoxy]methyl]-1,3-propanediyl] ester; 1-Aziridinepropanoic acid, 2-methyl-, 2-[[3-hydroxy-2,2-bis[[3-(2-methyl-1-aziridinyl)-1-oxopropoxy]methyl]propoxy]methyl]-2-[[3-(2-methyl-1-aziridinyl)-1-oxopropoxy]methyl]-1,3-propanediyl ester; 1-

Aziridinepropanoic acid, 2-propyl-, 2-(hydroxymethyl)-2-[[1-oxo-3-(2-propyl-1-aziridinyl)propoxy]methyl]-1,3-propanediyl ester; 1-Aziridinepropanoic acid, 2-[[3-(1-aziridinyl)-1-oxopropoxy]methyl]-2-(2-hydroxyethyl)-1,3-propanediyl ester; 1-Aziridinepropanoic acid, 2-methyl-, 2-(2-hydroxyethyl)-2-[[3-(2-methyl-1-aziridinyl)-1-oxopropoxy]methyl]-1,3-propanediyl ester; 1-Aziridinepropanoic acid, 2-methyl-, 1,1'-[2-[[3-[3-(1-aziridinyl)-1-oxopropoxy]-2-(hydroxymethyl)-2-[[3-(2-methyl-1-aziridinyl)-1-oxopropoxy]methyl]propoxy]methyl]-2-[[3-(2methyl-1-aziridinyl)-1-oxopropoxy]methyl]-1,3-propanediyl] ester; 1-Aziridinebutanoic acid, 1,1'-[2-[[3-(1-aziridinyl)-1-oxobutoxy]methyl]-2-(hydroxymethyl)-1,3-propanediyl] ester; 1-Aziridineacetic acid, 2-[[2-(1-aziridinyl)-1-oxoethoxy]methyl]-2-(hydroxymethyl)-1,3-propanediyl ester; β-Alanine, N-[2-(1-aziridinyl)ethyl]-, 3-[3-(1-aziridinyl)-1-oxopropoxy]-2-(hydroxymethyl)-2-[[(1-oxo-2-propen-1-yl)oxy]methyl]propyl ester; and mixtures thereof.

7. A process according to claim 6, wherein the second compound containing one or multiple amine and/or hydroxyl functions and that also contains one or multiple aziridine functional groups is selected from the group consisting of: 1-Aziridinepropanoic acid, 1,1'-[2-[[3-(1-aziridinyl)-1-oxopropoxy]methyl]-2-(hydroxymethyl)-1,3-propanediyl] ester, 1-Aziridinepropanoic acid, 2-ethyl-, 2-[[3-(2-ethyl-1-aziridinyl)-1-oxopropoxy] methyl]-2-(hydroxymethyl)-1,3-propanediyl ester and 1-Aziridinepropanoic acid, 2-methyl-, 1,1'-[2-(hydroxymethyl)-2-[[3-(2-methyl-1-aziridinyl)-1-oxopropoxy]methyl]-1,3-propanediyl] ester.

8. A process according to any of claims 1 to 7, wherein at least one of one or the multiple first and second compounds containing one or multiple amine and/or hydroxyl functions is a compound that contains one or multiple further reactive groups other than aziridine with a reactivity towards corresponding functional groups comprised in a polymer, for example by self-condensation or self-addition.

9. A process according to any of claims 1 to 8, wherein the second compound that contains one or multiple amine and/or hydroxyl functions contains an additional reactive functional group which is a halogen; alkenyl; arylalkene; alkynyl; arylalkyn; alkadiene; aldehyde; dialkylacetal; dithioacetal; ketone; unsaturated aldehyde; ketone or carboxylic ester; nitrile; imine; alkylalkoxy silane; alkoxysilane; anhydride; mixed anhydride; oxime-protected diisocyanate; diketone; ketoester; thioketoester; ketothioester; thioketothioester; or a reactive ring system, or a mixture of one or multiple of such reactive groups.

10. A process according to any of claims 1 to 9, wherein the first compound containing an hydrophilic group and one or multiple amine and/or hydroxyl functions is a polyethoxy mono- or diol with a molecular weight between 100 and 3000 Dalton, a polyethoxy/polypropoxy mono- or diol with a molecular weight between 100 and 3000 Dalton and an ethoxy/propoxy ratio between 100/0 and 25/75, a polyethoxy mono- or diamine with a molecular weight between 100 and 3000, a polyethoxy/polypropoxy mono- or diamine with a molecular weight between 100 and 3000 Dalton and an ethoxy/propoxy ratio between 100/0 and 25/75, a diol or diamine containing a pendant polyalkoxy chain, an hydroxyl- or amine alkylsulphonate, or a dialkylamino-alkyl- alcohol or amine, or a mixture thereof.

11. A process according to any of claims 1 to 10, wherein the polyisocyanate is 3-isocyanatomethyl-3,5,5-trimethylcyclohexylisocyanate, 1,6-hexyldiisocyanate, 1,5-pentyldiisocyanate or dicyclohexyl-methane-4,4'-diisocyanate, or mixtures thereof.

12. A process according to any of claims 1 to 11 wherein the aziridine-functional carbodiimide is not genotoxic.

13. An aziridine-functional polycarbodiimide obtainable by the process as defined in any one of the preceding claims.

14. A coating mixture comprising the aziridine-functional polycarbodiimide according to claim 13 as crosslinking agent and a polymer dispersed in water, which polymer contains carboxylic acid functions.

15. Cured material obtained by applying the coating mixture of claim 14 to a substrate, and evaporating the water and, if present, a further solvent.

16. A coated product comprising a coating of the cured material according to claim 15.