The invention also provides a gel, particularly a hydrophilic gel, obtainable via the method of the invention, and a medical device comprising the gel of the invention.

In the case where the swelling medium is water, a hydrogel is obtained.

LEGENDS TO THE FIGURE

Fig. 1 illustrates a general motif of polymeric photoinitiators, with photoinitiator moieties pendant on a polymeric backbone.

Figs. ~~2-9~~2-8 display the change in mechanical properties when a sample of pristine photoinitiator is exposed to UV light at 120 °C for various polyurethanes of the Examples. At time t=0 irradiation with UV light is started and an instant increase in both the loss and storage modules takes place. When the moduli are equal, a transition from liquid to solid proceeds by further UV radiation. If the sample is exposed to water after this curing step, a hydrogel material is obtained.

Fig. ~~10-9~~ illustrates the processes of the invention.

DETAILED DISCLOSURE OF THE INVENTION

Definitions

"Optionally-substituted" means optionally-substituted with one or more substituents selected from the group consisting of C1-C25 linear, branched or cyclic alkyl, aryl, -OH, -CN, halogens, amines, amides, alcohols, ethers, thioethers, sulfones and derivatives thereof, sulfonic acid and derivatives thereof, sulfoxides and derivatives thereof, carbonates, isocyanates, nitrates, acrylates. Preferably, the one or more substituents are selected from the group consisting of -OH, -CN, halogens, amines, amides, alcohols, ethers, thioethers, sulfones and derivatives thereof, sulfonic acid and derivatives thereof, sulfoxides and derivatives thereof, carbonates, isocyanates, nitrates, acrylates. Most preferably, the substituent is selected from the group consisting of -OH, -CN, halogens, amines, amides, alcohols, ethers, thioethers, sulfones and derivatives thereof, sulfonic acid and derivatives thereof, and sulfoxides and derivatives thereof.

Hydrophilic

storage modules had stabilized, a UV-lamp was turned on, thus irradiating the sample through the bottom plate on the rheometer via a fiber from the lamp. The loss and storage modules were then followed as a function of time, while the UV-lamp was irradiating the sample. Illustrative results of the measurements are shown in ~~Figure 1~~Figures 2-8. All the samples~~, except **14**,~~ increase their solid content as they are exposed to UV which is seen from the decrease in tan δ. An increase in tan δ signifies an increasing amount of liquid present in the sample. ~~Both samples~~Sample **11** ~~and **14**~~ appears to degrade when exposed to UV light as both the G' and G" modulus are decreasing, whereas the rest of the samples have increasing modulus when exposed to UV. Likewise values of tan δ below one is obtained for all samples except **11** ~~and **14**~~.

CLAIMS

1. A method for the manufacture of a gel, said method comprising the steps of

a. providing a matrix composition comprising a polymeric photoinitiator ~~of the general formula I~~ synthesized using:

(4-(3-(bis(2-hydroxyethyl)amino)propoxy)phenyl)(phenyl)methanone, PEG2000, and 4,4'-methylenebis(cyclohexyl-isocyanate);

~~$(-(R_1(A_1)_m)_u-(R_2(A_2)_n-O)_o-(R_3(A_3)_p-O)_q-(R_4(A_4)_r)_v-C(O)NH-R_5(A_5)_s-NHC(O))_t-$~~ ~~(I)~~

~~wherein R_2, R_3 and R_5 can each independently be selected from C1-C25 linear alkyl, C3-C25 branched alkyl, C3-C25 cycloalkyl, aryl and heteroaryl groups such as any aromatic hydrocarbon with up to 20 carbon atoms;~~

~~R_1 and R_4 are each independently selected from C1-C25 linear alkyl, C3-C25 branched alkyl, C3-C25 cycloalkyl, aryl, heteroaryl, hydrogen, -OH, -CN, halogens, amines, amides, alcohols, ethers, thioethers, sulfones and derivatives thereof, sulfonic acid and derivatives thereof, sulfoxides and derivatives thereof, carbonates, isocyanates, nitrates, acrylates, hydrazine, azines, hydrazides, polyethylenes, polypropylenes, polyesters, polyamides, polyacrylates, polystyrenes, and polyurethanes; and when R_1 and R_4 are alkyl and aryl groups, they may be substituted with one or more substituents selected from CN; OH; azides; esters; ethers; amides; halogen atoms; sulfones; sulfonic derivatives; NH_2 or $Nalk_2$, where alk is any C_1-C_8 straight chain alkyl group, C_3-C_8 branched or cyclic alkyl group;~~

~~m, n, p, r and s are real numbers, from 0 to 10, provided that the sum of n + p + s is a real number greater than 0;~~

~~o and q are real numbers from 0 to 10000;~~

~~u and v are real numbers from 0 to 1;~~

~~t is an integer from 1 to 10000; and~~

~~A_1, A_2, A_3, A_4 and A_5 are identical or different photoinitiator moieties,~~

b. curing the matrix composition obtained in step a. by exposing it to UV radiation, and

c. exposing the matrix composition to a swelling medium, thus providing a gel

wherein step c. may take place before or after step b.

~~2. The method according to claim 1, wherein R_1 and R_4 are end-functionalized with alcohol, ether, urethane or amine groups, alternatively other nucleophilic groups, in either one or both ends.~~

~~3. The method according to any one of the preceding claims, wherein R_1 and R_4 are selected from the group consisting of ethylene diamine, diethylene triamine, triethylene tetramine, propylene diamine, butylenes diamine, hexamethylene diamine, cyclohexylene diamine, piperazine, 2-methyl-piperazine, phenylene diamine, tolylene diamine, xylylene diamine, tris(2-aminoethyl) amine, 3,3'-dinitrobenzidine, 4,4'-methylenebis (2-chloroaniline), 3,3'-dichloro-4,4'-bi-phenyl diamine, 2,6-diaminopyridine, 4,4'-diaminodiphenylmethane, menthane diamine, m-xylene diamine and isophorone diamine.~~

~~4. The method according to claim 1, wherein R_1 and R_4 are selected from the group consisting of hydrazine, azines such as acetone azine, substituted hydrazines such as dimethyl hydrazine, 1,6-hexamethylene-bishydrazine, and carbodihydrazine, hydrazides of dicarboxylic acids and sulfonic acids such as adipic acid mono- or dihydrazide, oxalic acid dihydrazide, isophthalic acid, dihydrazide, tartaric acid dihydrazide, 1,3-phenylene disulfonic acid dihydrazide, omega-amino-caproic acid dihydrazide, hydrazides made by reacting lactones with hydrazine such as gamma-hydroxylbutyric hydrazide, bis-semi-carbazide, bis-hydrazide carbonic esters of glycols.~~

~~5. The method according to any one of the preceding claims, wherein R_5 is selected from the group consisting of C3-C25 cycloalkyl and aryl groups.~~

~~6. The method according to any one of the preceding claims, wherein R_2 and R_3 are each independently selected from C1-C25 linear alkyl, C3-C25 branched alkyl and C3-C25 cycloalkyl, preferably C1-C25 linear alkyl.~~

~~7. The method according to any one of the preceding claims, wherein at least one of A_1, A_2, A_3, A_4 and A_5 is a benzophenone moiety.~~

~~8. The method according to any one of the preceding claims, wherein A_1, A_2, A_3, A_4 and A_5 are selected from the group consisting of benzoin ethers, phenyl~~

~~hydroxyalkyl ketones, phenyl aminoalkyl ketones, benzophenones, thioxanthones, xanthones, acridones, anthraquinones, fluorenones, dibenzosuberones, benzils, benzil ketals, α-dialkoxy-acetophenones, α-hydroxy-alkyl-phenones, α-amino-alkyl-phenones, acyl-phosphine oxides, phenyl ketocoumarins, silane, maleimides, and derivatives thereof.~~

~~9. The method according to any one of the preceding claims, wherein A_1, A_2, A_3, A_4 and A_5 are selected from the group consisting of benzoin ethers, phenyl hydroxyalkyl ketones, phenyl aminoalkyl ketones, benzophenones, thioxanthones, xanthones and derivatives thereof.~~

~~10.~~2. The method according to ~~any one of the preceding claims~~claim 1, wherein the weight averaged molecular weight of the polymeric photoinitiator is between ~~0.2 kDa and 100 kDa~~ 29 kDa and 78 kDa.

~~11. The method according to any one of the preceding claims, wherein the weight averaged molecular weight of the polymeric photoinitiator is between 0.2 kDa and 75 kDa, preferably between 0.5 and 50 kDa.~~

~~12. The method according to any one of the preceding claims, wherein the weight averaged molecular weight of the polymeric photoinitiator is 0.5-40 kDa and the loading of benzophenone moiety is greater than 0 % and below 50 %.~~

~~13. The method according to any one of the preceding claims, wherein R_1 and R_4 are each independently selected from C1-C25 linear alkyl, C3-C25 branched alkyl and C3-C25 cycloalkyl.~~

~~14. The method according to any one of the preceding claims, wherein o and q are real numbers from 0-5000, preferably 100-2000.~~

~~15. The method according to any one of the preceding claims, wherein t is an integer from 1 to 5000, preferably 100-2000.~~

~~16. The method according to any one of the preceding claims, wherein the sum m + n + p + r + s is 1.~~

~~17. The method according to any one of the preceding claims, wherein s is greater than or equal to 1.~~

~~18. The method according to any one of the preceding claims, wherein r and v are greater than or equal to 1.~~

~~19. The method according to any one of claims 1-17, wherein r is zero.~~

~~20. The method according to any one of the preceding claims, wherein m is zero.~~

~~21. The method according to any one of the preceding claims, wherein p and q are greater than or equal to 1.~~

~~22.~~3. The method according to any one of the preceding claims, wherein the matrix composition additionally comprises one or more hydrophilic gel-forming polymers and/or hydrophilic gel-forming monomers.

~~23.~~4. The method according to claim ~~3~~2~~2~~, wherein the gel-forming polymer is selected from the group consisting of polyacrylates, polyalkylethers, polyurethanes, polyethylene vinyl acetates, polyvinylpyrrolidone and co-polymers and blends thereof.

~~24.~~5. The method according to claim ~~2~~2~~3~~, wherein the gel-forming monomer is selected from the group consisting of acrylate monomers, N-vinylpyrrolidone, and epoxide monomers.

~~25.~~6. The method according to any one of claims 1-~~2~~1~~2~~, wherein the matrix composition consists of the polymeric photoinitiator ~~of the general formula I,~~ as defined in claim 1.

~~26.~~7. The method according to any of the preceding claims, where the swelling medium is selected from the group consisting of water, C1-C5 alcohols, glycerol and polyethylene glycol (PEG)~~, preferably PEG-2000~~.

~~27.~~8. The method according to claim ~~2~~9~~7~~, where the swelling medium comprises water, and the hydrophilic gel thus produced is a hydrogel.

~~28.~~9. The method according to any one of the preceding claims, wherein step c. takes place before step b.

~~29.~~10. The method according to any one of the preceding claims, consisting of steps a., b. and c.

~~30. The method according to any one of the preceding claims, wherein the gel is a hydrophilic gel and wherein;~~

~~R_2, R_3 and R_5 are each independently be selected from C1-C3 linear alkyl, and~~

~~R_1 and R_4 are each independently selected from C1-C25 linear alkyl, C3-C25 branched alkyl, C3-C25 cycloalkyl, aryl, heteroaryl, hydrogen, -OH, -CN, halogens, amines, amides, alcohols, ethers, thioethers, sulfones and derivatives thereof, sulfonic acid and derivatives thereof, sulfoxides and derivatives thereof, carbonates, isocyanates, nitrates, acrylates, hydrazine, azines, hydrazides, polyethylenes, polypropylenes, polyesters, polyamides, polyacrylates, and polyurethanes; and when R_1 and R_4 are alkyl and aryl groups, they may be substituted with one or more substituents selected from CN; OH; azides; esters; ethers; amides; halogen atoms; sulfones; sulfonic derivatives; NH_2 or Nalk$_2$, where alk is any C_1-C_8 straight chain alkyl group, C_3-C_8 branched or cyclic alkyl group.~~

~~31.~~11. A gel, obtainable via the method of any of claims 1-~~30~~10.

~~32.~~12. A medical device comprising the gel of claim ~~30~~11.

~~33.~~13. A medical device according to claim ~~31~~12 coated on at least a surface portion thereof with the gel of claim ~~30~~11.

14. A medical device according to claim 12, wherein the medical device is a urinary catheter.