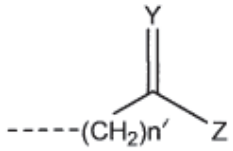
R_{10} is selected from H, the alkyl, aryl and alkylaryl groups, OR_{11} and $NR_{11}R_{12}$ where R_{11} and R_{12} are selected, independently of each other, from H, the alkyl, aryl, alkylaryl and acyl groups,

or R_{10} is selected from CN, COR_{13}, $COOR_{13}$ and $CONR_{13}R_{14}$, where R_{13} and R_{14} are selected, independently of each other, from H and the alkyl, aryl and alkylaryl groups,

or R_{10} represents CH_2OR_{15} where R_{15} is selected from H and the alkyl, aryl, alkylaryl and acyl groups,

or R_5 meets formula (III)

[Chem III]



(III)

where

n' = 0-24

Y is selected from O and NR_{16} where R_{16} is selected from the alkyl, aryl, alkylaryl groups, OR_{14} where R_{14} is as defined before

Z is selected from H, the alkyl, aryl, alkylaryl groups, CN,

COR_{17} where R_{17} is selected from H, the alkyl, aryl and alkylaryl groups and from the OR_{18}, $NR_{18}R_{19}$ groups where R_{18}, R_{19} and R_{20} are selected, independently of each other, from H and the alkyl, aryl and arylalkyl groups, and CH_2OR_{20} where R_{20} is selected from H and the alkyl, aryl, alkylaryl and acyl groups, and

OR_{18} and $NR_{18}R_{19}$ where R_{18} and R_{19} are selected, independently of each other, from H and the alkyl, aryl and arylalkyl groups,

which method comprises the reaction of a compound of formula (IV)

[Chem IV]

$$R_1 - (X)_m - R_{21}$$

(IV)

wherein

X is selected from S and Se;

m = 1 or 2;

R_1 is as defined hereinabove for the compound (I), that is to say it is selected from the alkyl, aryl, alkylaryl and heteroaryl groups, possibly carrying one or several function(s), said functions being selected from

the hydroxyl function and the derivative functions thereof like the ether function,

the carbonyl function like the ketone and aldehyde functions, and the derivative functions thereof like the hemiacetal and acetal functions, and

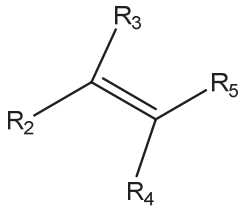
the carboxylic acid function and the derivative functions thereof like the carboxylic acid ester functions; and

if m = 1, R_{21} represents H;

if m = 2, R_{21} is selected from the alkyl, aryl and alkylaryl groups.

with a compound of formula (V):

[Chem V]

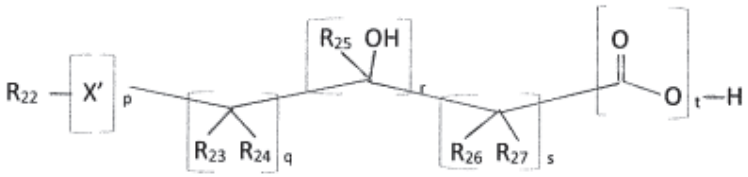


(V)

where R_2, R_3, R_4 and R_5 are as defined hereinabove for the compound of formula (I),

by irradiation with radiations having a wavelength from 200 to 800 nm in the presence of at least one compound carrying at least one function selected from the alcohol, carboxylic acid, thioether and selenoether functions, said compound being represented by formula (VI),

[Chem VI]



(VI)

wherein

X' is selected from S or Se;

p and t amount, independently of each other, to 0 or 1;

q, r and s amount, independently of each other, to 0 to 10;

provided that p + r + t is greater than or equal to 1 and if p ≠ 0 then q + s ≠ 0;

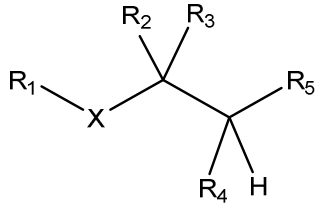
R_{22} is selected, if p = 0, from H and the alkyl, aryl and arylalkyl groups and, if p = 1, from the alkyl, aryl and arylalkyl groups; and

R_{23}, R_{24}, R_{25}, R_{26} and R_{27} are selected, independently of each other, from H and the alkyl, aryl and alkylaryl groups.

CLAIMS

1. A method for preparing a compound of formula (I)

[Chem I]



(I)

wherein

X is selected from S, Se;

R_1 is selected from the alkyl, aryl, alkylaryl and heteroaryl groups, possibly carrying one or several function(s), said functions being selected from

the hydroxyl function and the derivative functions thereof like the ether function,

the carbonyl function like the ketone and aldehyde functions, and the derivative functions thereof like the hemiacetal and acetal functions, and

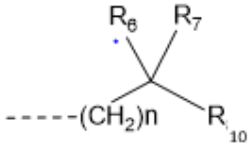
the carboxylic acid function and the derivative functions thereof like the carboxylic acid ester functions;

R_2, R_3 and R_4 are selected, independently of each other, amongst H and the alkyl, aryl and alkylaryl groups; or R_2 and R_4 form together a C5-C10 carbon cycle;

R_5 is selected from H and the alkyl, aryl and alkylaryl groups,

or R_5 meets formula (II)

[Chem II]



(II)

where

n=0-24

R_6 and R_7 are selected, independently of each other, from H, the alkyl, aryl and alkylaryl groups, OR_8, NR_8R_9 where R_8 and R_9 are selected, independently of each other, from H and the alkyl, aryl, alkylaryl and acyl groups;

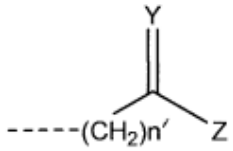
R_{10} is selected from H, the alkyl, aryl and alkylaryl groups, OR_{11} and $NR_{11}R_{12}$ where R_{11} and R_{12} are selected, independently of each other, from H, the alkyl, aryl, alkylaryl and acyl groups,

or R_{10} is selected from CN, COR_{13}, $COOR_{13}$ and $CONR_{13}R_{14}$, where R_{13} and R_{14} are selected, independently of each other, from H and the alkyl, aryl and alkylaryl groups,

or R_{10} represents CH_2OR_{15} where R_{15} is selected from H and the alkyl, aryl, alkylaryl and acyl groups,

or R_5 meets formula (III)

[Chem III]



(III)

where

n' = 0-24

Y is selected from O and NR_{16} where R_{16} is selected from the alkyl, aryl, alkylaryl groups, OR_{14} where R_{14} is as defined before

Z is selected from H, the alkyl, aryl, alkylaryl groups, CN,

COR_{17} where R_{17} is selected from H, the alkyl, aryl and alkylaryl groups and from the OR_{18}, $NR_{18}R_{19}$ groups where R_{18}, R_{19} and R_{20} are selected, independently of each other, from H and the alkyl, aryl and arylalkyl groups, and CH_2OR_{20} where R_{20} is selected from H and the alkyl, aryl, alkylaryl and acyl groups, and

OR_{18} and $NR_{18}R_{19}$ where R_{18} and R_{19} are selected, independently of each other, from H and the alkyl, aryl and arylalkyl groups,

which method comprises the reaction of a compound of formula (IV)

[Chem IV]

$$R_1 - (X)_m - R_{21}$$

(IV)

wherein

X is selected from S and Se;

m = 1 or 2;

R_1 is as defined hereinabove for the compound (I), that is to say it is selected from the alkyl, aryl, alkylaryl and heteroaryl groups, possibly carrying one or several function(s), said functions being selected from

the hydroxyl function and the derivative functions thereof like the ether function,

the carbonyl function like the ketone and aldehyde functions, and the derivative functions thereof like the hemiacetal and acetal functions, and

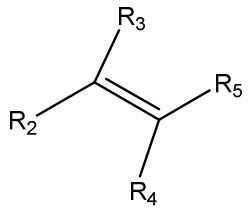
the carboxylic acid function and the derivative functions thereof like the carboxylic acid ester functions; and

if m = 1, R_{21} represents H;

if m = 2, R_{21} is selected from the alkyl, aryl and alkylaryl groups.

with a compound of formula (V):

[Chem V]

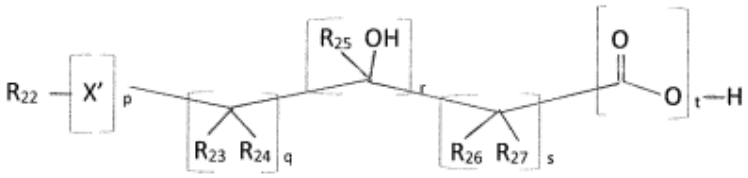


(V)

where R_2, R_3, R_4 and R_5 are as defined hereinabove for the compound of formula (I),

by irradiation with radiations having a wavelength from 200 to 800 nm in the presence of at least one compound carrying at least one function selected from the alcohol, carboxylic acid, thioether and selenoether functions, said compound being represented by formula (VI),

[Chem VI]



(VI)

wherein

X' is selected from S or Se;

p and t amount, independently of each other, to 0 or 1;

q, r and s amount, independently of each other, to 0 to 10;

provided that p + r + t is greater than or equal to 1 and if p ≠ 0 then q + s ≠ 0;

R_{22} is selected, if p = 0, from H and the alkyl, aryl and arylalkyl groups and, if p = 1, from the alkyl, aryl and arylalkyl groups; and

R_{23}, R_{24}, R_{25}, R_{26} and R_{27} are selected, independently of each other, from H and the alkyl, aryl and alkylaryl groups.

2. The method according to claim 1, characterized in that the radiation has a wavelength from 254 to 400 nm, preferably 365 nm ± 20 nm.

3. The method according to claim 1 or 2, characterized in that the compound (VI) comprises at least alkyl sulfides such as methyl sulfide and ethyl sulfide, propionic acid, butanoic acid, lactic acid, 3-hydroxy-propionic acid, 3-hydroxy-butyric acid, 1-hydroxycaproic acid, 3-methylthiopropanoic acid, 4-methylthiobutanol, 2,4-hydroxybutyric (2,4-DHB) acid, methylthiobutyric acid (MHA) and methylthiobutanediol (MTBDO).

4. The method according to any one of the preceding claims, characterized in that the compound (VI) has an amount of at least 0.1 eq, preferably at least 0.5 eq, and preferably at most 10 eq, still at most 5 eq, and even better at most 2 eq, for 1 eq of compound (V).

5. The method according to any one of the preceding claims, characterized in that a compound (IV) is reacted, selected from any alkylthiol or alkylselenol like methanethiol, ethanethiol, n-butanethiol, tertiobutanethiol, methaneselenol, from any alkylthiol or alkylselenol carrying one or several hydroxyl, carbonyl, carboxylic acid or carboxylic ester function(s), like thioglycolic acid, or from disulfides and diselenides, like alkyl disulfide or diselenide, such as dimethyl or aryl disulfide, such as diphenyl disulfide and diphenyl diselenide.

6. The method according to any one of the preceding claims, characterized in that a compound (V) is reacted, selected from butene, pentene, hexene, 2,3-dimethylbutene, but-3-enoic acid, but-2-enoic acid, but-3-en-2-ol, butene-diol, cyclohexene, vinyl glycolic acid (VGA) and methyl vinyl glycolate (MVG).

7. The method according to claim 6, characterized in that the compound (I) is selected from the 4-methylthio-2-hydroxybutyric acid, the 4-methylseleno-2-hydroxybutyric acid and esters thereof.

8. The method according to any one of the preceding claims, characterized in that the molar ratio of the compound (IV) to the compound (V) ranges from 1.1-15:1, still from 1.2-10:1.

9. The method according to any one of the preceding claims, characterized in that the reaction is performed in the presence of a type I or II, preferably type II, photoinitiator such as thioxanthone or benzophenone.