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DESCRIPTION

FLUORINATED ALCOHOL COMPOSITION

TECHNICAL FIELD

The present invention relates to a solvent
5 composition suitable for use in producing information-
recording media including optical disks such as CD-Rs and
DVD-Rs.

BACKGROUND ART

To be usable for producing information-recording
10 media such as CD-Rs, a solvent is required not to
decompose the substrate, to dissolve dyes and to have an
appropriate evaporation rate. Heretofore, fluorinated
alcohols such as $\text{H}(\text{CF}_2\text{CF}_2)_n\text{CH}_2\text{OH}$ ($n = 1$ to 3) have been
used for this purpose (Japanese examined patent
15 publication No. 1995-96333).

However, some dyes have a low solubility in
fluorinated alcohol and certain combinations of dyes or
dyes and quenchers result in a reduced solubility in
fluorinated alcohol. In such cases, they are not usable
20 for producing information-recording media. On the other
hand, some general-purpose solvents including hydrocarbons,
alcohols, ethers, ketones, esters and the like readily
dissolve dyes, dye compositions or dye quencher
compositions which have a low solubility in fluorinated
25 alcohols; however, these solvents have a high tendency to

dissolve or swell the resinous substrate of an information-recording medium and therefore they are not very useable for this purpose.

An object of the present invention is to provide
5 a solvent composition which does not adversely affect the substrate of an information-recording medium and still has a high ability to dissolve dyes.

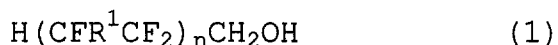
DISCLOSURE OF INVENTION

The inventors conducted extensive research to
10 achieve the above object. Consequently, they found that a solvent composition comprising fluorinated alcohol mixed with an organic solvent having a specific SP has, in a particular compounding ratio, a high ability to dissolve dyes, dye compositions or dye quencher compositions which
15 have a low solubility in fluorinated alcohols. Further, it only affects the substrate of the information-recording medium within an allowable level.

The present invention provides the solvent composition, information-recording medium and dye solution
20 as described in items 1 to 9 below.

Item 1. A solvent composition comprising:

a fluorinated alcohol represented by the following formula (1):



25 wherein n is 1 or 2, R^1 represents F or CF_3 when n is 1,

and represents F when n is 2; and

an organic solvent having an SP (solubility parameter) of 4 to 20.

Item 2. The composition according to item 1,
5 wherein the ratio of fluorinated alcohol is in the range of between 30 mass% and 99 mass%.

Item 3. The solvent composition according to item 1, wherein the organic solvent has a boiling point of 30 °C to 250 °C.

10 Item 4. The solvent composition according to item 1, wherein the organic solvent comprises at least one member selected from the group consisting of acetonitrile, HCFC141b(1,1-dichloro-1-fluoroethane), CFC113(1,1,2-trichloro-1,2,2-trifluoroethane), DAA(diacetone alcohol),
15 acetone, isophorone, methanol, ethanol, 1-propanol, 1-butanol, diethyl ether, diisopropyl ether, THF, ethylene glycol dimethyl ether, ethylene glycol diethyl ether, ethylene glycol monomethyl ether, ethylene glycol monoethyl ether, MEK, methyl isobutyl ketone,
20 cyclohexanone, DMF, n-hexane, n-heptane, n-octane, n-decane, n-dodecane, cyclohexane, toluene, ethyl acetate, butyl acetate, dimethyl carbonate, dioxane, dichloromethane, chloroform, carbon tetrachloride, 1,1,2,2-tetrachloroethane and DMSO.

25 Item 5. The solvent composition according to

item 1, wherein the percentage change in the land width
(between apex portions) of a resinous information-
recording medium substrate measured before and after
immersing in the solvent composition, immediately removing
5 and air-drying the information-recording medium substrate
is 10 % or less.

Item 6. The solvent composition according to
item 5, wherein the material of the resinous information-
recording medium is at least one member selected from the
10 group consisting of polycarbonate resin, acrylic resin,
vinyl chloride-base resin, epoxy resin, amorphous
polyolefin and polyester.

Item 7. An information-recording medium formed
with the solvent composition according to item 1
15 comprising a substrate provided with a recording layer
where information can be recorded and/or reproduced by
means of a laser beam.

Item 8. A dye solution comprising the solvent
composition according to item 1.

20 Item 9. The dye solution according to item 8,
wherein the dye is at least one member selected from the
group consisting of cyanine-based dyes, phthalocyanine-
based dyes, azo-based dyes, pyrylium-based dyes,
thiopyrylium-based dyes, squalilium-based dyes, azulenium-
25 based dyes, indophenol-based dyes, indoaniline-based dyes,

triphenylmethane-based dyes, chinone-based dyes, aminium-based dyes, diimmonium-based dyes and metal complex salt-based dyes.

Preferable examples of the organic solvents
5 usable in the solvent composition of the invention include all organic solvents except C₁-C₄ saturated aliphatic alcohols (such as methanol, ethanol, n-propanol, isopropanol, n-butanol, isobutanol, sec-butanol, t-butanol).

10 The names, SPs and boiling points of organic solvents usable in the solvent composition of the invention are shown below.

	<u>Solvent</u>	<u>SP</u>	<u>Boiling point(°C)</u>
15	Acetonitrile	11.9	81.6
	HCFC141b	7.9	32
	CFC113	7.2	47.6
	Dimethyl formamide(DMF)	12.1	153
	Ethanol	12.7	78.32
20	1-propanol	11.9	97.4
	1-butanol	11.4	99.5
	Methyl ethyl ketone(MEK)	9.3	79.53
	Methyl isobutyl ketone	8.4	116.7
	Cyclohexanone	9.9	155
25	Cyclohexane	8.2	81.4

	Toluene	8.9	110.6
	Ethyl acetate	9.1	76.82
	Butyl acetate	8.5	112
	n-hexane	7.3	68.74
5	n-heptane	7.4	98.4
	n-octane	7.6	125.67
	n-decane	6.6	174.12
	n-dodecane	7.9	216.27
	Dioxane	10.0	101.4
10	Dichloromethane	9.7	39.8
	Chloroform	9.3	61.2
	Diethyl ether	7.4	34.48
	Tetrahydrofuran (THF)	9.1	66
	Diacetone alcohol (DAA)	9.2	167.9
15	Dimethyl sulfoxide (DMSO)	12.0	189
	Methanol	14.5	64.65
	Acetone	9.9	56.3
	Carbon tetrachloride	8.6	76.74
	Dimethyl carbonate	9.9	90.2
20	1,1,2,2-tetrachloroethane	9.7	147
	Diisopropyl ether	6.9	69
	Ethylene glycol diethyl ether	8.3	124
	Ethylene glycol dimethyl ether	8.6	84.7
	Ethylene glycol monoethyl ether	11.4	135.1
25	Ethylene glycol monomethyl ether	10.5	124.5

The organic solvents contained in the solvent composition of the invention have SPs (solubility parameter) of generally about 4 to about 20, and preferably about 6 to about 15.

The organic solvents used in the solvent composition of the invention preferably have boiling points of about 30 °C to about 250 °C.

10 The solubility of dyes in the solvent composition of the invention at 25 °C is preferably about 1.3 mass% or higher, and more preferably about 3.5 mass% or higher.

15 In the solvent composition of the invention, the proportion of fluorinated alcohol represented by formula (1) is preferably about 30 mass% to about 99 mass%, and more preferably about 70 mass% to about 95 mass%.

20 The residue on evaporation of the solvent composition of the invention is generally about 50 mass ppm or less, preferably about 25 mass ppm or less, and more preferably about 10 mass ppm or less.

25 The residue on evaporation can be obtained as below. Precisely, the residual weight of the solvent composition of the invention is measured after being subjected to volatilization at 40 °C under 6.7×10^2 Pa

and expressed by mass ppm in $\text{HCF}_2\text{CF}_2\text{CH}_2\text{OH}$.

The absorbency in methanol of the solvent composition of the invention at 205 nm is generally about 0.1 abs or lower, preferably about -0.1 abs or lower, and
5 more preferably about -0.2 abs or lower. The absorbency in methanol is measured by using a test portion obtained by mixing 1 ml of the solvent composition of the invention and 3 ml of methanol. As reference, methanol is used.

The solvent composition of the invention
10 "contains substantially no impurities" when (i) the residue on evaporation of the solvent composition of the invention is generally about 50 mass ppm or less, preferably about 25 mass ppm or less, and more preferably about 10 mass ppm or less and/or (ii) the absorbency in
15 methanol of the solvent composition of the invention at 205 nm is generally about 0.1 abs or lower, preferably about -0.1 abs or lower, and more preferably about -0.2 abs or lower.

When a polycarbonate information-recording
20 medium substrate (for example, a CD-R substrate) is air-dried immediately after being immersed in the solvent of the composition, the land width (between apex portions) after immersion is generally about 90 % to about 110 % of the land width before immersion, preferably about 95 % to
25 about 105 %. The land width (between apex portions) can

be confirmed by electron microscope photography.

An information-recording medium having a substrate provided with a recording layer for recording and/or reproducing information by means of a laser beam
5 can be produced by dissolving a dye in the solvent containing the fluorinated alcohol represented by formula (1) of the invention, preferably fluorine-based solvent containing the fluorinated alcohol, and forming a recording layer containing a dye in a conventional manner
10 such as by applying the obtained solvent to the substrate and drying. Specific examples of dyes are cyanine-based dyes, phthalocyanine-based dyes, azo-based dyes, pyrylium-based dyes, thiopyrylium-based dyes, squalilium-based dyes, azulanium-based dyes, indophenol-based dyes, indoaniline-based dyes, triphenylmethane-based dyes, chinone-based
15 dyes, aminium-based dyes, diimmonium-based dyes and metal complex salt-based dyes. Among those, preferable dyes are cyanine-based dyes, phthalocyanine-based dyes and azo-based dyes. In the recording layer, a quencher can be
20 used in combination with dyes for preventing deterioration or decomposition of the dyes while producing or storing the information-recording medium or recording or reproducing information. Specific examples of substrate are polycarbonate, polymethyl methacrylate, epoxy resin,
25 amorphous polyolefin, polyester, polyvinyl chloride and

like plastics, glass, ceramics and the like. A
primecoating layer can be provided between the recording
layer and the substrate for improving smoothness and
adhesive strength or preventing degeneration of the
5 recording layer. It is also possible to provide a
protective layer on a recording layer.

The present invention provides a solvent
composition suitably usable, without adversely affecting
the substrate, for producing an information-recording
10 medium (CD-R, DVD-R and like optical disks) comprising a
substrate provided with a recording layer where
information can be recorded and or/reproduced.

BEST MODE FOR CARRYING OUT THE INVENTION

Below, the present invention is explained in
15 further detail with Examples and Comparative Examples.
However, the scope of the present invention is not limited
to these Examples.

Three kinds of fluorinated alcohols,
HCF₂CF₂CH₂OH(TFP), HCF₂CF₂CF₂CF₂CH₂OH(OFP) and
20 HCF(CF₃)CF₂CH₂OH(HFB), were used.

Six kinds of organic solvents, acetonitrile,
HCFC141b, CFC113, DAA, acetone and isophorone, were used.

Preparation of test solvent in Examples 1 to 10:
and Comparative Examples 1 to 10

25 The test solvents were obtained in the

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compounding ratios shown in Table 1.

Table 1

		<u>Fluorinated alcohol</u>		<u>Organic solvent</u>	
		Type	Content	Type	Content
			(mass%)		(mass%)
5	Example 1	TFP	90	Acetonitrile	10
	Example 2	TFP	80	HCFC141b	20
	Example 3	TFP	95	HCFC141b	5
	Example 4	TFP	80	CFC113	20
	Example 5	TFP	50	DAA	50
10	Example 6	HFB	30	DAA	70
	Example 7	TFP	90	Acetone	10
	Example 8	TFP	70	Isophorone	30
	Example 9	OFP	70	Isophorone	30
	Example 10	TFP	85	Acetone	10
15				HCFC141b	5
	Comparative Example 1	TFP	100	-	-
	Comparative Example 2	OFP	100	-	-
	Comparative Example 3	HFB	100	-	-
	Comparative Example 4	TFP	25	Acetonitrile	75
20	Comparative Example 5	-	-	Acetonitrile	100
	Comparative Example 6	-	-	HCFC141b	100
	Comparative Example 7	-	-	CFC113	100
	Comparative Example 8	-	-	DAA	100
	Comparative Example 9	-	-	Acetone	100
25	Comparative Example 10	-	-	Isophorone	100

Tests and Results

Using the test solvents shown in Table 1, Tests 1 and 2 were conducted as below. Table 2 shows the results.

5 Test 1: Measurement of effect on polycarbonate CD-R substrate

Polycarbonate CD-R substrates (land width:1.2 μ m) were immersed in the solvents of Examples 1 to 10 and Comparative Examples 1 to 10 and dried immediately after
10 immersion. The polycarbonate CD-R substrates were observed using an electron microscope and the effect on the CD-R substrates was evaluated based on the change in land width. Table 2 shows the results. The effect on the CD-R substrate was evaluated as below.

15 A: The percentage change in land width caused by immersion was 5 % or lower.

B: The percentage change in land width caused by immersion was 10 % or lower.

C: The percentage change in land width caused by immersion
20 was 15 % or lower.

D: The percentage change in land width caused by immersion was higher than 15 %.

Test 2: Measurement for solubility of dye

Five parts by weight of cyanine-based dye OM-57
25 (Fuji Photo Film Co., Ltd.) and two parts by weight of

EST-3 (Sumitomo Seika Chemicals Co., Ltd.) used as a quencher were blended to prepare a dye mixture. The saturated solubility of this dye mixture in the test solvents of Examples 1 to 10 and Comparative Examples 1 to 10 was obtained and evaluated by the following criteria. Table 2 shows the results.

- A: Saturated solubility was 3.5 mass% or higher.
 B: Saturated solubility was 1.3 mass% or higher and lower than 3.5 mass%.
 10 C: Saturated solubility was 0.8 mass% or higher and lower than 1.3 mass%.
 D: Saturated solubility was lower than 0.8 mass%.

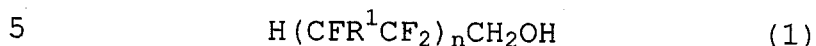
Table 2			
	Solubility of dye	Effect on substrate	Overall rating
15 Example 1	B	A	B
Example 2	A	A	A
Example 3	B	A	B
20 Example 4	A	A	A
Example 5	B	A	B
Example 6	B	B	B
Example 7	B	A	B
Example 8	B	A	B
25 Example 9	B	A	B
Example 10	B	A	B

	Comparative Example 1	C	A	C
	Comparative Example 2	C	A	C
	Comparative Example 3	C	B	C
	Comparative Example 4	D	D	D
5	Comparative Example 5	B	D	D
	Comparative Example 6	A	D	D
	Comparative Example 7	A	D	D
	Comparative Example 8	B	C	C
	Comparative Example 9	B	D	D
10	<u>Comparative Example 10</u>	<u>B</u>	<u>D</u>	<u>D</u>

CLAIMS

1. A solvent composition comprising:

a fluorinated alcohol represented by the following formula (1):



wherein n is 1 or 2, R^1 represents F or CF_3 when n is 1, and represents F when n is 2; and

an organic solvent having an SP (solubility parameter) of 4 to 20.

10

2. The composition according to Claim 1, wherein the ratio of fluorinated alcohol is in the range of between 30 mass% and 99 mass%.

15

3. The solvent composition according to Claim 1, wherein the organic solvent has a boiling point of 30 °C to 250 °C.

4. The solvent composition according to Claim 1,
20 wherein the organic solvent comprises at least one member selected from the group consisting of acetonitrile, HCFC141b(1,1-dichloro-1-fluoroethane), CFC113(1,1,2-trichloro-1,2,2-trifluoroethane), DAA(diacetone alcohol), acetone, isophorone, methanol, ethanol, 1-propanol, 1-
25 butanol, diethyl ether, diisopropyl ether, THF, ethylene

glycol dimethyl ether, ethylene glycol diethyl ether,
ethylene glycol monomethyl ether, ethylene glycol
monoethyl ether, MEK, methyl isobutyl ketone,
cyclohexanone, DMF, n-hexane, n-heptane, n-octane, n-
5 decane, n-dodecane, cyclohexane, toluene, ethyl acetate,
butyl acetate, dimethyl carbonate, dioxane,
dichloromethane, chloroform, carbon tetrachloride,
1,1,2,2-tetrachloroethane and DMSO.

10 5. The solvent composition according to Claim 1,
wherein the percentage change in the land width (between
apex portions) of a resinous information-recording medium
substrate measured before and after immersing in the
solvent composition, immediately removing and air-drying
15 the information-recording medium substrate is 10 % or less.

 6. The solvent composition according to Claim 5,
wherein the material of the resinous information-recording
medium is at least one member selected from the group
20 consisting of polycarbonate resin, acrylic resin, vinyl
chloride-based resin, epoxy resin, amorphous polyolefin
and polyester.

 7. An information-recording medium formed with
25 the solvent composition according to Claim 1 comprising a

substrate provided with a recording layer where information can be recorded and/or reproduced by means of a laser beam.

5 8. A dye solution comprising the solvent
composition according to Claim 1.

9. The dye solution according to Claim 8,
wherein the dye dissolved in the dye solution is at least
one member selected from the group consisting of cyanine-
based dyes, phthalocyanine-based dyes, azo-based dyes,
pyrylium-based dyes, thiopyrylium-based dyes, squalilium-
based dyes, azulenium-based dyes, indophenol-based dyes,
indoaniline-based dyes, triphenylmethane-based dyes,
quinone-based dyes, aminium-based dyes, diimmonium-based
dyes and metal complex salt-based dyes.