The experimental results as summarized in Table 4 demonstrate that hydrophilic coating compositions according to present invention and based on ethanol as solvent can also be applied as a single-layer hydrophilic and lubricious coating on a urinary catheter to provide a performance within the desired window (Ex. 20-24), like the commercial reference ComfortCoat® 41001/43005. As the present coating compositions differ considerably from this 2-layer system, e.g. in crosslinker (PTGL-TDI-HEA) and in solvent (ethanol), parameters like crosslinker concentration and viscosity of the coating composition, in combination with coating conditions like pull-up speed and cure time, need optimization. Although test results when applying the composition of Ex. 20 were at the boundary of targeted performance under tested conditions, the data on Ex. 21-24 indicate that by changing processing conditions further improvements are feasible with such composition (see Table 4).

Table 1

Experiment	**Coating composition**						**Coating conditions**			**Friction testing**	
	Polymerizable compound		*Polyvinyl-pyrrolidone*	*Benzo-phenone*	*I-2959*	*Tween 80*	*Substrate*	*Pull-up speed*	*Cure time*	*Lubricity; averaged friction*	*Durability; friction change*
	*(mass%) *)*		*(mass%) *)*	*(mass%) *)*	*(mass%) *)*	*(mass%) *)*		*(mm/s)*	*(s)*	*(g)*	*(g)*
CE A [reference]	2-layer system	ComfortCoat® 41002 / 43003					PA 12 rod	1 1	120 180	4.6 ± 0.2 7.2 ± 0.7	0.6 ± 0.3 -0.1 ± 0.3
CE B	8.9	PEG-DAA	87.8	1.83	0.37	1.10	PA 12 rod	3	240	[>200]	nd
CE C	8.6 3.2	PEG-DAA PTGL-TDI-HEA	84.9	1.77	0.48	1.06	PA 12 rod	1	180	[>15]	1.7 ± 3.4
Ex 1	8.3 6.4	PEG-DAA PTGL-TDI-HEA	82.0	1.71	0.60	1.02	PA 12 rod	1	180	4.3 ± 2.0	1.1 ± 3.9
Ex 2	8.0 9.5	PEG-DAA PTGL-TDI-HEA	79.1	1.65	0.71	0.99	PA 12 rod	5	120	4.7 ± 0.3	-0.2 ± 0.3
Ex 3	7.7 12.6	PEG-DAA PTGL-TDI-HEA	76.3	1.59	0.82	0.95	PA 12 rod	1 3	180 240	3.5 ± 0.4 4.6 ± 0.4	-0.2 ± 0.2 -0.2 ± 0.2
Ex 4	6.6 24.4	PEG-DAA PTGL-TDI-HEA	65.5	1.37	1.25	0.82	PA 12 rod	3	240	6.4 ± 0.6	-0.5 ± 0.5
CE D	4.7 45.7	PEG-DAA PTGL-TDI-HEA	46.1	0.96	2.02	0.58	PA 12 rod	3	240	[>15]	-6.6± 5
Ex 5	4.7	PTGL-TDI-HEA	91.8	1.82	0.56	1.17	PA 12 rod	1 1	120 180	5.2 ± 0.6 5.2 ± 0.6	-0.5 ± 0.4 -0.5 ± 0.4
Ex 6	7.3	PTGL-TDI-HEA	89.5	1.41	0.62	1.15	PA 12 rod	1 1 1	60 120 180	5.5 ± 0.5 6.6 ± 0.5 8.5 ± 0.6	0.3 ± 0.6 1.0 ± 0.6 0.5 ± 0.4
Ex 7	9.0	PTGL-TDI-HEA	87.3	1.73	0.74	1.26	PA 12 rod	1 1	120 180	4.6 ± 3.2 5.6 ± 0.2	-0.5 ± 0.7 -0.8 ±0.3
Ex 8	9.3	PTGL-TDI-HEA	88.0	0.88	0.71	1.15	PA 12 rod	1	120	4.9 ± 0.6	-0.3 ± 0.3
Ex 9	9.5	PTGL-TDI-HEA	86.1	2.55	0.54	1.35	PA 12 rod	1	120	5.7 ± 0.4	-0.9 ± 0.4
Ex 10	16.7	PTGL-TDI-HEA	79.7	1.58	1.01	1.06	PA 12 rod	1	180	6.5 ± 0.2	-0.9 ± 04
Ex 11	23.3	PTGL-TDI-HEA	73.2	1.46	1.20	0.91	PA 12 rod	1	180	7.6 ± 0.7	-1.5 ± 0.1
Ex 12	7.3	PTGL-TDI-HEA	88.9	2.67	0	1.14	PA 12 rod	1	180	5.2 ± 0.7	-0.8 ± 0.4
Ex 13	7.0	PTGL-TDI-HEA	89.7	2.68	0.66	0	PA 12 rod	1	180	5.0 ± 0.7	-0.6 ± 0.5

**) mass% based on dry mass of total composition (i.e. excluding solvent)*

Table 2

Experiment	**Coating composition**						**Coating conditions**			**Friction testing**	
	Polymerizable compound		*Polyvinyl-pyrrolidone*	*Benzo-phenone*	*I-2959*	*Tween 80*	*Substrate*	*Pull-up speed*	*Cure time*	*Lubricity; averaged friction*	*Durability; friction change*
	(mass%) *)		*(mass%)* *)	*(mass%)* *)	*(mass%)* *)	*(mass%)* *)		*(mm/s)*	*(s)*	*(g)*	*(g)*
CE A [reference]	2-layer system	ComfortCoat® 41002 / 43003					PA 12 rod	1 1	120 180	4.6 ± 0.2 7.2 ± 0.7	0.6 ± 0.3 -0.1 ± 0.3
Ex 14	6.8	PTGL-IPDI-HEA	89.8	1.32	0.64	1.36	PA 12 rod	1 1 1	60 120 180	8.7 ± 7.6 5.4 ± 0.3 9.6 ± 2.5	4.5 ± 7.9 1.1 ± 0.8 2.8 ± 4.1
Ex 15	7.0	PTHF-IPDI-HEA	89.7	1.42	0.65	1.20	PA 12 rod	1 1 1	60 120 180	6.9 ± 1.2 5.7 ± 0.5 7.9 ± 0.9	1.1 ± 1.1 0.8 ± 0.6 1.8 ± 0.6
CE E	7.2	PPG1000-IPDI-HEA	89.5	1.44	0.66	1.20	PA 12 rod	1	120	[>15]	
CE F	7.0	PPG2000-TDI-HEA	89.8	1.38	0.64	1.16	PA 12 rod	1	120	[>15]	
CE G	12.8	PPG2000-TDI-HEA	84.2	1.29	0.64	1.06	PA 12 rod	1	120	[>15]	
CE H	7.0	PPG8000-TDI-HEA	89.7	1.36	0.58	1.34	PA 12 rod	1	120	[>15]	
CE I	7.0	PEG-IPDI-HEA	89.6	1.38	0.62	1.44	PA 12 rod	1	120	[>15]	

*) *mass% based on dry mass of total composition (i.e. excluding solvent)*

Table 3

Experiment	**Coating composition**						**Coating conditions**			**Friction testing**	
	Polymerizable compound		*Polyvinyl-pyrrolidone*	*Benzo-phenone*	*I-2959*	*Tween 80*	*Substrate*	*Pull-up speed*	*Cure time*	*Lubricity; averaged friction*	*Durability; friction change*
	(mass%) *)		*(mass%)* *)	*(mass%)* *)	*(mass%)* *)	*(mass%)* *)		*(mm/s)*	*(s)*	*(g)*	*(g)*
CE J [reference]	2-layer system	ComfortCoat® 41002 / 43003					PVC tube	1	180	7.5 ± 0.7	-0.1 ± 0.3
Ex 16	7.7 12.6	PEG-DAA PTGL-IPDI-HEA	76.3	1.59	0.82	0.95	PVC tube	1 2	180 240	12.0 ± 1.6 7.8 ± 0.7	0.8 ± 0.7 -1.6 ± 0.5
CE K [reference]	2-layer system	ComfortCoat® 41002 / 43003					PA 12 tube	0.5	120	10.1 ± 1.0	-0.3 ± 0.3
Ex 17	9.2	PTGL-IPDI-HEA	87.2	1.75	0.72	1.09	PA 12 tube	0.5	120	11.4 ± 2.8	-0.8 ± 0.4
CE L [reference]	2-layer system	ComfortCoat® 41002 / 43003					Pebax 63D rod	0.5	120	2.9 ± 0.5	0.2 ± 0.2
Ex 18	9.2	PTGL-IPDI-HEA	87.2	1.75	0.72	1.09	Pebax 63D rod	0.5	120	2.5 ± 0.2	0.2 ± 0.2
CE M [reference]	2-layer system	ComfortCoat® 41002 / 43003					Pebax 72D rod	0.5	120	3.6 ± 0.5	0.2 ± 0.6
Ex 19	9.2	PTGL-IPDI-HEA	87.2	1.75	0.72	1.09	Pebax 72D rod	0.5	120	3.1 ± 0.2	-0.1 ± 0.2

*) *mass% based on dry mass of total composition (i.e. excluding solvent)*

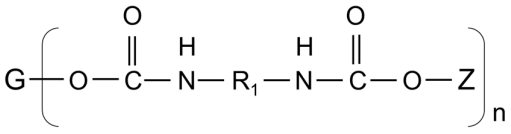
Table 4

Experiment	**Coating composition**						**Viscosity**	**Coating conditions**			**Friction testing**		
	Polymerizable compound		*PVP*	*Benzo-phenone*	*I-2959*	*Tween 80*		*Substrate*	*Pull-up speed*	*Cure time*	*Lubricity; averaged friction*	*Durability; friction change*	*Dry-out; friction at 10 min.*
	*(mass%) *)*		*(mass%) *)*				(mm^2/s)		*(mm/s)*	*(s)*	*(g)*	*(g)*	*(g)*
CE N [reference]	2-layer system	ComfortCoat® 41001 / 43005					90 (topcoat)	PVC tube	10	360	2.9±0.3	-0.8±0.4	3.8±0.6
Ex 20	7.0	PTGL-TDI-HEA	89.6	1.7	0.6	1.1	120	PVC tube	10	120	14.7±2.7	-2.3±1.3	- [30% > 10] ???
Ex 21	4.5	PTGL-TDI-HEA	92.3	2.0	0.5	0.7	70	PVC tube	10	120	5.6±0.6	-1.1±0.5	6.4±1.2
Ex 22	4.5	PTGL-TDI-HEA	92.3	2.0	0.5	0.7	70	PVC tube	10	150	7.7±0.8	-0.7±0.4	6.8±1.8
Ex 23	2.3	PTGL-TDI-HEA	94.0	2.1	0.5	1.1	78	PVC tube	10	120	7.6±0.4	-2.3±0.5	5.8±2.2
Ex 24	2.3	PTGL-TDI-HEA	94.0	2.1	0.5	1.1	78	PVC tube	10	180	7.9±1.1	-2.0±1.0	7.9±1.8

**) mass% based on dry mass of total composition (i.e. excluding solvent)*

Claims

1. A photo-curable hydrophilic coating composition comprising
   (a) a polymerizable compound of formula [1], wherein G is a residue of a hydrophobic hydroxy-functional oligomer; n is 1-10, each R_1 independently is a residue of a C_6-C_{20} aliphatic, cycloaliphatic, or aromatic hydrocarbon compound, and Z is a moiety having a polymerizable group, wherein the polymerizable group is an unsaturated group;

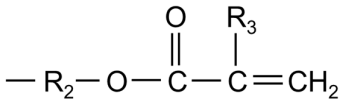


[1]

   (b) a hydrophilic polymer;
   (c) a photo-initiator;
   (d) optionally one or more further components, and
   (e) a solvent for components (a)-(c);

   wherein the polymerizable compound of formula [1] is present in an amount of 2.0-30 mass% based on the total dry mass of the composition.
2. The coating composition according to claim 1, wherein n is 1.8 - 3, or preferably 1.8 - 2.2.
3. The coating composition according to claim 1 or 2, wherein G is a residue of a hydroxy-functional hydrophobic oligomer chosen from the group consisting of polyethers, polyesters, polycarbonates, polyurethanes, polyepoxides, polyamides, poly(meth)acrylamides, poly(meth)acrylates, and polyolefins, or any combination thereof.
4. The coating composition according to any one of claims 1-3, wherein the hydroxy-functional oligomer is a polyether, preferably a polytetrahydrofuran diol or a poly(tetrahydrofuran-co-methyl tetrahydrofuran) diol**.**
5. The coating composition according to any one of claims 1-4, wherein R_1 is a residue of 2,4-toluene, 2,6-toluene, hexane, butane, cyclohexane, or isophorone
6. The coating composition according to any one of claims 1-4, wherein the polymerizable group is an olefinic group, a styrenic group, or a (meth)acrylic group.
7. The coating composition according to any one of claims 1-6, wherein Z is a (meth)acrylic moiety of formula [2], wherein each R_2 independently is a C_1-C_{10} alkyl,

and each R_3 independently is hydrogen or methyl.



[2]

8. The coating composition according to any one of claims 1-7, wherein the polymerizable compound of formula [1] is the reaction product of a polyether diol based on tetrahydrofuran or comprising tetrahydrofuran and methyl tetrahydrofuran, toluene diisocyanate, and hydroxyethyl acrylate.
9. The coating composition according to any one of claims 1-8, wherein the hydrophilic polymer comprises a non-ionic polymer, preferably the hydrophilic polymer is a polyvinylpyrrolidone or a polyethylene oxide.
10. The coating composition according to any one of claims 1-9, wherein the photo-initiator comprises a Norrish type II initiator, preferably the coating composition comprises a mixture of Norrish Type II and Norrish Type I photo-initiators.
11. The coating composition according to any one of claims 1-10, further comprising a surfactant, an antioxidant, an osmolality-increasing compound, and/or a hydrophilic polymerizable compound.
12. The coating composition according to any one of claims 1-11, wherein the composition contains 40-99.5 mass% of solvent, which solvent is a polar organic liquid miscible with water, like at least one of methanol, ethanol, propanol, isopropanol, butanol, isobutanol, t-butanol; acetone, methylethyl ketone, or tetrahydrofuran.
13. The coating composition according to any one of claims 1-12 comprising, based on total dry mass of the composition,
    - 2.0-30 mass% of component (a);
    - 97.8-30 mass% of component (b);
    - 0.2-5 mass% of component (c); and
    - 0-35 mass% of component (d);

    and wherein the sum of (a)-(d) is 100%.
14. A method of applying a hydrophilic and optionally lubricious coating to an article comprising steps of:
    - applying a coating composition according to any one of claims 1-13 to at least a part of a surface of the article;
    - at least partly removing the solvent from the applied coating composition;
    - curing the applied coating composition by exposing to a radiation source during or after removing solvent to form a hydrophilic coating; and
    - optionally contacting the hydrophilic coating with a wetting agent to form a lubricious coating.

15. A medical device or a component thereof, having on at least part of its surface a single-layer, hydrophilic, and optionally lubricious coating, which article is obtained by the method of claim 14.