Claims

1. A multi-layer foil comprising at least a PMMA based layer A and a PMMA based layer B, wherein the layer A comprises, based on the total weight of the layer A:

from 0.0 to 99.9 wt.-% of a polymethyl(meth)acrylate;
from 0.0 to 95.0 wt.-% of one or several impact modifiers;
from 0.0 to 30.0 wt.-% of a fluoropolymer;
from 0.1 to 5.0 wt.-% of a first UV-absorber;
from 0.0 to 5.0 wt.-% of one or several UV-stabilizers;

wherein the cumulative content of the polymethyl(meth)acrylate and of one or several impact modifiers in the layer A is at least 50 wt.-%, preferably at least 60 wt.-%, more preferably at least 70 wt.-%, yet even more preferably at least 80 wt.-%, still more preferably at least 90 wt.-%, particularly preferably at least 95 wt.-% and not more than 99.9 wt.-%, based on the weight of the layer A; and wherein
the spectral transmittance of the layer A at any wavelength λ_A is not more than 10%; wherein $270\ nm \leq \lambda_A \leq 360\ nm$; and

the layer B comprises, based on the total weight of the layer B:

from 0.0 to 99.9 wt.-% of a polymethyl(meth)acrylate;
from 0.0 to 85.0 wt.-% of one or several impact modifiers;
from 0.1 to 5.0 wt.-% of a second UV-absorber, which is distinct from the first UV-absorber;
from 0.0 to 5.0 wt.-% of one or several UV-stabilizers; and
from 0.0 to 20.0 wt.-% of an adhesion-promoting copolymer comprising
(i) from 70.0 to 95.0 wt.-% methyl methacrylate;
(ii) from 0.5 to 15.0 wt.-% maleic anhydride; and
(iii) from 0.0 to 25.0 wt.-% of other vinyl-copolymerizable monomers having no functional groups other than the vinyl function, based on the weight of the adhesion-promoting copolymer; and

wherein the cumulative content of the polymethyl(meth)acrylate and of one or several impact modifiers in the layer B is at least 50 wt.-%, preferably at least 60 wt.-%, more preferably at least 70 wt.-%, yet even more preferably at least 80 wt.-%, still more preferably at least 90 wt.-%, particularly preferably at least 95 wt.-% and not more than 99.9 wt.-%, based on the weight of the layer B, and wherein
the spectral transmittance of the layer B at any wavelength λ_B is not more than 10%; wherein $270\ nm \leq \lambda_B \leq 370\ nm$; and

the layer A comprises not more than 0.1 wt.-%, preferably not more than 0.05 wt.-% of the second UV absorber and

the layer B comprises not more than 0.1 wt.-%, preferably not more than 0.05 wt.-% of the first UV absorber.

2. A multi-layer foil comprising at least a PMMA based layer A and a PMMA based layer B, wherein the layer A comprises, based on the total weight of the layer A:

from 0.0 to 99.0 wt.-% of a polymethyl(meth)acrylate;
from 0.0 to 95.0 wt.-% of one or several impact modifiers;
from 0.0 to 30.0 wt.-% of a fluoropolymer;
from 1.0 to 30.0 wt.-% of a first UV-absorber, wherein the first UV-absorber is an inorganic particulate material, which is preferably selected from zinc oxide, titanium dioxide, cerium dioxide, tin dioxide, silica and glass; and
from 0.0 to 5.0 wt.-% of one or several UV-stabilizers;

wherein the cumulative content of the polymethyl(meth)acrylate and of one or several impact modifiers in the layer A is at least 50 wt.-%, preferably at least 60 wt.-%, more preferably at least 70 wt.-%, yet even more preferably at least 80 wt.-%, still more preferably at least 90 wt.-%, particularly preferably at least 95 wt.-% and not more than 97.0 wt.-%, based on the weight of the layer A; and wherein

the spectral transmittance of the layer A at any wavelength λ_A is not more than 20%; wherein 270 nm $\leq \lambda_A \leq$ 310 nm; and

the layer B comprises, based on the total weight of the layer B:

from 0.0 to 99.9 wt.-% of a polymethyl(meth)acrylate;
from 0.0 to 85.0 wt.-% of one or several impact modifiers;
from 0.1 to 5.0 wt.-% of a second UV-absorber, which is distinct from the first UV-absorber;
from 0.0 to 5.0 wt.-% of one or several UV-stabilizers; and
from 0.0 to 20.0 wt.-% of an adhesion-promoting copolymer comprising
(i) from 70.0 to 95.0 wt.-% methyl methacrylate;
(ii) from 0.5 to 15.0 wt.-% maleic anhydride; and
(iii) from 0.0 to 25.0 wt.-% of other vinyl-copolymerizable monomers having no functional groups other than the vinyl function, based on the weight of the adhesion-promoting copolymer; and

wherein the cumulative content of the polymethyl(meth)acrylate and of one or several impact modifiers in the layer B is at least 50 wt.-%, preferably at least 60 wt.-%, more preferably at least

70 wt.-%, yet even more preferably at least 80 wt.-%, still more preferably at least 90 wt.-%, particularly preferably at least 95 wt.-% and not more than 99.9 wt.-%, based on the weight of the layer B, and wherein

the spectral transmittance of the layer B at any wavelength λ_B is not more than 10%; wherein

270 nm ≤ λ_B ≤ 370 nm; and

the layer A comprises not more than 0.1 wt.-%, preferably not more than 0.05 wt.-% of the second UV absorber and

the layer B comprises not more than 0.1 wt.-%, preferably not more than 0.05 wt.-% of the first UV absorber.

3. Foil according to Claim 1 or 2, wherein the foil further comprises an adhesion-promoting layer C, wherein the layer C comprises, based on the total weight of the layer C:

from 0.0 to 95.0 wt.-% of a polymethyl(meth)acrylate;
from 0.0 to 75.0 wt.-% of one or several impact modifiers;
from 0.0 to 5.0 wt.-% of a UV-absorber, which is preferably the second UV-absorber;
from 0.0 to 5.0 wt.-% of one or several UV-stabilizers; and
from 5.0 to 80.0 wt.-% of an adhesion-promoting copolymer comprising

(i) from 70.0 to 95.0 wt.-% methyl methacrylate;
(ii) from 0.5 to 15.0 wt.-% maleic anhydride; and
(iii) from 0.0 to 25.0 wt.-% of other vinyl-copolymerizable monomers having no functional groups other than the vinyl function, based on the weight of the adhesion-promoting copolymer; and

wherein the cumulative content of the polymethyl(meth)acrylate and of one or several impact modifiers in the layer C is at least 20.0 wt.-%, preferably at least 30.0 wt.-%, more preferably at least 40.0 wt.-% and not more than 95.0 wt.-%, based on the weight of the layer C; and

the layer B comprises less than 3.0 wt.-%, preferably less than 1.0 wt.-%, based on the weight of the layer B, of said adhesion-promoting copolymer.

4. Foil according to any of Claims 1 to 3, wherein the foil further comprises a fluoropolymer-based layer D, which is adjacent to the layer A, the layer D comprising, based on the total weight of the layer D:

from 40.0 to 100.0 wt.-% of at least one fluoropolymer;
from 0.0 to 60.0 wt.-% of a polymethyl(meth)acrylate; and
from 0.0 to 30.0 wt.-% of substantially spherical glass beads.

5. Foil according to any of Claims 1 to 4, wherein the fluoropolymer is selected from polyvinylidene fluoride (PVDF), polyvinylfluoride (PVF), polytetrafluorethylene (PTFE), polyethylenetetrafluoroethylene (ETFE), fluorinated ethylene-propylene (FEP) or a mixture or copolymers thereof.

6. Foil according to any of Claims 1 to 5, wherein the foil further comprises a layer E, which is located between the layer A and the layer B and comprises a combination of the first UV absorber and the second UV absorber.

7. Foil according to any of Claims 1 and 3 to 6, wherein

the layer A comprises from 0.5 to 3.0 wt.-%, based on the weight of the layer A, of a triazine type compound as a first UV absorber; and

the layer B comprises from 0.5 to 4.0 wt.-%, based on the weight of the layer B, of a benzotriazole type compound as a second UV absorber.

8. Foil according to any of Claims 1 to 7, wherein the UV-stabilizer is a hindered amine light stabilizer (HALS) or an antioxidant.

9. Foil according to any of Claims 1 to 8, wherein the polymethyl(meth)acrylate is polymethyl methacrylate having an average molar weight Mw of from 80 000 g/mol to 220 000 g/mol and is obtainable by polymerization of a composition whose polymerizable constituents comprise, based on the weight of the polymerisable composition:

(a) from 50.0 to 99.9 wt.-%, preferably from 80.0 to 99.9 wt.-%, more preferably from 91.0 to 99.9 wt.-% of methyl methacrylate,
(b) from 0.1 to 50.0 wt.-%, preferably from 0.1 to 20.0 wt.-%, more preferably from 0.1 to 9.0 wt.-% of an acrylic acid ester of a C1-C4 alcohol,
(c) from 0.0 to 10.0 wt.-% of at least one further monomer copolymerizable with the monomers (a) and (b).

10. Foil according to any of Claims 1 to 9, wherein
the layer A has a thickness from 10.0 µm to 100.0 µm, preferably from 15.0 µm to 50.0 µm, more preferably from 20.0 µm to 40.0 µm; and
the layer B has a thickness from 10.0 µm to 80.0 µm, preferably from 15.0 µm to 50.0 µm, more preferably from 20.0 µm to 40.0 µm;
the layer C, if present, has a thickness from 1.0 µm to 20.0 µm, preferably from 2.0 µm to 15.0 µm, more preferably from 3.0 µm to 10.0 µm;

the layer D, if present, has a thickness from 1.0 µm to 40.0 µm, preferably from 2.0 µm to 30.0 µm, more preferably from 3.0 µm to 20.0 µm; and
the layer E, if present, has a thickness from 10.0 µm to 80.0 µm, preferably from 15.0 µm to 50.0 µm, more preferably from 20.0 µm to 40.0 µm.

11. Foil according to any of Claims 1 to 10, wherein the foil has an average transmittance of not more than 40%, preferably not more than 30%, more preferably not more than 10% in a wavelength interval from 350 nm to 390 nm.

12. Foil according to any of Claims 1 to 11, wherein the spectral transmittance of the foil at any wavelength λ is not more than 5%, preferably not more than 2%, more preferably not more than 1%; wherein 270 nm ≤ λ ≤ 370 nm after accelerated weathering testing for 15 000 hours according to the norm ISO 4892-2 (2013), method 1, 30 GJ/m^2 radiant exposure.

13. Foil according to any of Claims 1 to 12 wherein the foil has a luminous transmittance D_{65} of more than 60%, preferably more than 70%, more preferably more than 80% for each wavelength from 400 nm to 800 nm, measured before a weathering test according to norm DIN EN ISO 13468-2 (2006).

14. A coated article having an outer surface and comprising a substrate which is at least partially covered by a foil according to any of Claims 1 to 13, wherein the foil is preferably a co-extruded foil and comprises the following layers located in the following order, starting from the outer surface:

- optionally, the layer D;
- the layer A;
- optionally, the layer E;
- the layer B; and
- optionally, the layer C.

15. A coated article according to Claim 14, wherein the coated article is a high-pressure laminate (HPL), a medium pressure laminate (MPL) or a continuous pressure laminate (CPL).

16. A coated article according to Claim 14 or 15, wherein, the substrate is a melamine-resin-impregnated paper, a polymeric material which is optionally fibre-reinforced, preferably polyvinyl chloride (PVC), polycarbonate or polypropylene (PP) or a metal, preferably steel or aluminium, and the co-extruded foil is directly applied to the substrate.

17. Use of a foil according to any of Claims 1 to 13 for coating of a substrate, preferably by a process selected from co-extrusion, lamination or extrusion lamination.