DESCRIPTION

TITLE OF INVENTION: PROCESSING AID, MASTER BATCH, THERMOPLASTIC RESIN COMPOSITION, AND FILM

TECHNICAL FIELD

[0001]

The disclosure relates to processing aids, masterbatches, thermoplastic resin compositions, and films.

BACKGROUND ART

[0002]

In processing of melt-fabricable thermoplastic resin, rapid extrusion is required to achieve improved productivity and low cost. Still, melt-fabricable thermoplastic resin compositions inevitably have a critical shear rate and extrusion at a rate higher than this critical shear rate causes a rough surface called melt fracture, resulting in a failure in providing a good molded article.

[0003]

Patent Literatures 1 and 2 propose techniques of improving the processibility of thermoplastic resin, specifically processing aids containing a high molecular weight polyethylene glycol. However, the effects thereof are insufficient.

CITATION LIST

- Patent Literature

[0004]

Patent Literature 1: JP 2017-538833 T

Patent Literature 2: US 2005/0070644

SUMMARY

- Technical Problem

[0005]

The disclosure aims to provide a processing aid and masterbatch capable of improving the processibility of a thermoplastic resin, as well as a thermoplastic resin composition and film formed therefrom.

- Solution to Problem

[0005a]

In an aspect, there is provided a processing aid comprising a biodegradable polymer having a melting point of (a) 65°C or higher; or (b) 65°C or higher and 190°C or lower, and
at least one selected from the group consisting of a synergist, an ethylene-vinyl alcohol copolymer, and a lubricant (A), and
wherein the synergist includes at least one selected from the group consisting of polyol, polycaprolactone, silicone, and a polyamide-polyether block copolymer each of which has a melting point of 80°C or lower,
wherein the lubricant (A) includes at least one selected from the group consisting of an alcohol, and a surfactant

[0005b]

In another aspect, there is provided a masterbatch comprising the processing aid as defined above and a thermoplastic resin (A),
wherein the thermoplastic resin (A) includes (a) a polyolefin resin; or (b) a polyolefin resin and the polyolefin resin includes polyethylene.

[0005c]

In another aspect, there is provided a masterbatch comprising the processing aid as defined above and a thermoplastic resin (A),

wherein the thermoplastic resin (A) and the processing aid have a mass ratio (thermoplastic resin (A):processing aid) of 99:1 to 5:95.

[0005d]

In another aspect, there is provided a masterbatch comprising the processing aid as defined above and a thermoplastic resin (A), wherein the masterbatch has a melt flow rate of 0.01 to 100 g/10 min at 190°C and a 2.16 kgf load.

[0005e]

In another aspect, there is provided a thermoplastic resin composition comprising:

the processing aid as defined above and/or the masterbatch as defined above; and

a thermoplastic resin (B),

wherein the thermoplastic resin (B) includes (a) a polyolefin resin; or (b) a polyolefin resin and the polyolefin resin includes polyethylene

[0005f]

In another aspect, there is provided a thermoplastic resin composition comprising:

the processing aid as defined above and/or the masterbatch as defined above; and

a thermoplastic resin (B),

wherein the processing aid is contained in an amount of 0.001 to 5% by mass.

[0006]

The disclosure (1) relates to a processing aid containing a biodegradable polymer having a melting point of 65°C or higher.

[0007]

The disclosure (2) relates to the processing aid according to the disclosure (1), wherein the melting point of the biodegradable polymer is 190°C or lower.

[0008]

The disclosure (3) relates to the processing aid according to the disclosure (1) or (2), wherein the biodegradable polymer includes an aliphatic polyester.

[0009]

The disclosure (4) relates to the processing aid according to the disclosure (3), wherein the aliphatic polyester includes at least one selected from the group consisting of polylactic acid and polybutylene succinate.

[0010]

The disclosure (5) relates to the processing aid according to any one of the disclosures (1) to (4), wherein the biodegradable polymer has a melt flow rate of 0.01 to 500 g/10 min at 190°C and a 2.16 kgf load.

[0011]

The disclosure (6) relates to the processing aid according to any one of the disclosures (1) to (5), further containing a synergist that includes at least one selected from the group consisting of polyol, polycaprolactone, silicone, and a polyamide-polyether block copolymer each of

disclosures (28) to (31).

[0038]

The disclosure (33) relates to a method for producing the processing aid according to any one of the disclosures (1) to (22), including a mixing step and an ejecting step.

[0039]

The disclosure (34) relates to a method for producing the masterbatch according to any one of the disclosures (23) to (27), including a mixing step and an ejecting step.

[0040]

The disclosure (35) relates to a method for producing the thermoplastic resin composition according to any one of the disclosures (28) to (31), including a mixing step and an ejecting step.

[0041]

The disclosure (36) relates to a method for producing the film according to the disclosure (32), including a molding step.

- Advantageous Effects

[0042]

The disclosure can improve the processibility of thermoplastic resin.

DESCRIPTION OF EMBODIMENTS

[0043]

The disclosure will be specifically described hereinbelow.

[0044]

<Processing aid>

The processing aid of the disclosure contains a biodegradable polymer having a melting point of 65°C or higher.

[0045]

The biodegradable polymer herein means a polymer that

CLAIMS

Claim 1. A processing aid comprising a biodegradable polymer having a melting point of (a) 65°C or higher; or (b) 65°C or higher and 190°C or lower, and
at least one selected from the group consisting of a synergist, an ethylene-vinyl alcohol copolymer, and a lubricant (A), and
wherein the synergist includes at least one selected from the group consisting of polyol, polycaprolactone, silicone, and a polyamide-polyether block copolymer each of which has a melting point of 80°C or lower,
wherein the lubricant (A) includes at least one selected from the group consisting of an alcohol, and a surfactant.

Claim 2. The processing aid according to claim 1,
wherein (a) the biodegradable polymer includes an aliphatic polyester; or (b) the biodegradable polymer includes an aliphatic polyester and the aliphatic polyester includes at least one selected from the group consisting of polylactic acid and polybutylene succinate.

Claim 3. The processing aid according to claim 1 or 2, further comprising the synergist and/or the ethylene-vinyl alcohol copolymer.

Claim 4. The processing aid according to claim 1 or 2,
wherein the polyol includes polyethylene glycol and/or polyethylene oxide.

Claim 5. The processing aid according to claim 4,
wherein the polyethylene glycol has a number average molecular weight of 1000 to 50000, the polyethylene oxide has a viscosity average molecular weight of 100000 to

10000000, and the polycaprolactone has a weight average molecular weight of 2000 to 100000.

Claim 6. The processing aid according to any one of claims 1 to 5,

wherein the ethylene-vinyl alcohol copolymer has a melt flow rate of 40 g/10 min or lower at 190°C and a 2.16 kgf load.

Claim 7. The processing aid according to any one of claims 1 to 6,

wherein the ethylene-vinyl alcohol copolymer has an ethylene content of 10 to 50 mol%.

Claim 8. The processing aid according to any one of claims 1 to 7,further comprising the synergist,

wherein the biodegradable polymer, the ethylene-vinyl alcohol copolymer, and the synergist have a mass ratio (biodegradable polymer:ethylene-vinyl alcohol copolymer:synergist) of (1 to 98):(1 to 98):(1 to 98), or (25 to 90):(5 to 70):(5 to 70).

Claim 9. The processing aid according to any one of claims 1 to 8, further comprising the lubricant (A).

Claim 10. The processing aid according to any one of claims 1 to 9, further comprising the ethylene-vinyl alcohol copolymer,

wherein the biodegradable polymer, the ethylene-vinyl alcohol copolymer, and the lubricant (A) have a mass ratio (biodegradable polymer:ethylene-vinyl alcohol copolymer:lubricant (A)) of (1 to 98):(1 to 98):(1 to 98), or (25 to 93):(5 to 70):(2 to 70).

Claim 11. A masterbatch comprising the processing aid

according to any one of claims 1 to 10 and a thermoplastic resin (A),

wherein the thermoplastic resin (A) includes (a) a polyolefin resin; or (b) a polyolefin resin and the polyolefin resin includes polyethylene.

Claim 12. A masterbatch comprising the processing aid according to any one of claims 1 to 10 and a thermoplastic resin (A),

wherein the thermoplastic resin (A) and the processing aid have a mass ratio (thermoplastic resin (A):processing aid) of 99:1 to 5:95.

Claim 13. A masterbatch comprising the processing aid according to any one of claims 1 to 10 and a thermoplastic resin (A),

wherein the masterbatch has a melt flow rate of 0.01 to 100 g/10 min at 190°C and a 2.16 kgf load.

Claim 14. A thermoplastic resin composition comprising:

the processing aid according to any one of claims 1 to 10 and/or the masterbatch according to any one of claims 11 to 13; and

a thermoplastic resin (B),

wherein the thermoplastic resin (B) includes (a) a polyolefin resin; or (b) a polyolefin resin and the polyolefin resin includes polyethylene.

Claim 15. A thermoplastic resin composition comprising:

the processing aid according to any one of claims 1 to 10 and/or the masterbatch according to any one of claims 11 to 13; and

a thermoplastic resin (B),

wherein the processing aid is contained in an amount of 0.001 to 5% by mass.