In brief summary, a sheet of the disclosure comprises: (1) a core member comprising one or more layers and having a first major surface and (2) a slip control layer as described herein. The slip control layer is disposed on at least a portion of the first major surface and comprises: (i) a footing layer disposed on the first major surface of the core member, (iii) a binder layer disposed on the footing layer, and (iii) an array of particles disposed in the binder layer and footing layer and protruding therefrom. Hence, in a first aspect, there is provided a sheet comprising: (1) a core member comprising a multilayer optical film having one or more layers and having a first major surface and (2) a slip control layer disposed on at least a portion of the first major surface, wherein the slip control layer comprises: (i) a footing layer disposed on at least a portion of the first major surface of the core member, wherein the footing layer is viscoelastic and has a T_g that is lower than either the T_g or the T_m of the polymer at the first major surface of the core member, and wherein the footing layer is from about 0.5 to about 3 microns thick, (ii) a binder layer disposed on the footing layer, and (iii) an array of particles disposed in the binder layer and footing layer and protruding therefrom, wherein the average diameter of the particles is greater than the combined thickness of the footing layer and binder layer such that the particles protrude from the slip control layer opposite the core member. In sheets of the disclosure, the average diameter of the particles is greater than the combined thickness of the foot layer and binder layer.

In a second aspect, there is provided the sheet as defined herein arranged in substantially planar form. In a third aspect, there is provided a plurality of sheets as defined herein arranged in a stack. In a fourth aspect, there is provided the sheet as defined herein wound upon itself into roll form.

Briefly summarizing, the method of the disclosure for making such sheets comprises: (1) providing a core member comprising one or more layers and having a first major surface; (2) forming a footing layer on at least a portion of the first major surface; (3) applying a binder layer composition containing particles as described herein on at least a portion of the footing layer; then (5) tentering the assembly under sufficient heat to soften the footing layer such that particles sink into the footing layer perhaps so far so as to contact the first major surface of the core member, wherein the average diameter of the particles is greater than the combined thickness of the footing layer and the binder layer. Hence, in a fifth aspect, there is provided a process for making a sheet comprising: (1) providing a core member comprising a multilayer optical film having one or more layers and having a first major surface; (2) forming a footing layer on at least a portion of the first major surface, wherein the footing layer is viscoelastic and has a T_g that is lower than either the T_g or the T_m of the polymer at the first major surface of the core member and wherein the footing layer is from about 0.5 to about 3 microns thick; (3) applying a binder layer composition comprising a film forming polymer and particles to the surface of the footing layer; then (4) tentering the assembly under sufficient heat to soften the footing layer such that the particles sink into the footing layer, the footing layer, binder layer, and particles constituting a slip control layer, wherein the average diameter of the particles is greater than the combined thickness of the footing layer and binder layer such that the particles protrude from the surface of the slip control layer opposite the core member.

Sheets of the invention can be easily handled, e.g.., during manufacture and subsequent converting. Exploitation of the invention can make possible surprising improvements in runability, reduced waste, and improved yields.

Brief Description of Drawing

The invention is further explained with reference to the drawing wherein:

Fig. 1 is a cross-sectional view of a portion of a sheet of the invention;

Fig. 2 is an end view of a plurality of sheets of the invention arranged in a stack; and

Fig. 3 is an end view of a portion of a sheet of the invention wound into roll form;

These figures are idealized, are not to scale and are intended to be merely illustrative and not limiting.

Key and Glossary

For the following defined terms, these definitions shall be applied, unless a different definition is given in the claims or elsewhere in this specification.

The term "polymer" will be understood to include polymers, copolymers (e.g., polymers formed using two or more different monomers), oligomers and combinations thereof, as well as polymers, oligomers, or copolymers that can be formed in a miscible blend by, for example, coextrusion or reaction, including transesterification. Both block and random copolymers are included, unless indicated otherwise.

Unless otherwise indicated, all numbers expressing quantities of ingredients, properties such as molecular weight, reaction conditions, and so forth used in the specification and claims are to be understood as being modified in all instances by the term "about". Accordingly, unless indicated to the contrary, the numerical parameters set forth in the foregoing specification and attached claims are

What is claimed is:

1. A sheet comprising:

(1) a core member comprising a multilayer optical film having one or more layers and having a first major surface and

(2) a slip control layer disposed on at least a portion of the first major surface, wherein the slip control layer comprises: (i) a footing layer disposed on at least a portion of the first major surface of the core member, wherein the footing layer is viscoelastic and has a T_g that is lower than either the T_g or the T_m of the polymer at the first major surface of the core member, and wherein the footing layer is from about 0.5 to about 3 microns thick, (ii) a binder layer disposed on the footing layer, and (iii) an array of particles disposed in the binder layer and footing layer and protruding therefrom, wherein the average diameter of the particles is greater than the combined thickness of the footing layer and binder layer such that the particles protrude from the slip control layer opposite the core member.

~~2. The sheet of claim 1 wherein the core member comprises multilayer optical film.~~

~~3~~2. The sheet of claim 1 wherein the footing layer is amorphous.

~~4. The sheet of claim 1 wherein the footing layer is viscoelastic and has a T_g that is lower than either the T_g or the T_m of the polymer at the first major surface of the core member.~~

~~5~~3. The sheet of claim 1 wherein the footing layer has a T_g of at least about 85°C.

~~6~~4. The sheet of claim 1 wherein the footing layer is strippable from the core member.

~~7. The sheet of claim 1 wherein the footing layer is from about 0.5 to about 3 microns thick.~~

~~8~~5. The sheet of claim 1 wherein the binder layer is from about 100 to about 500 nanometers thick.

~~9~~6. The sheet of claim 1 wherein a mean particle diameter of the particles is from about 2 to about 30 microns.

~~10~~7. The sheet of claim 1 wherein the particles constitute from about 5 to about 20 weight percent of the total weight of the particles plus binder layer.

~~11~~8. The sheet of claim 1 wherein the core member has a second major surface further comprising a second footing layer disposed on the second major surface, a second binder layer disposed on the second footing layer, and an array particles disposed in the second binder layer and second footing layer and protruding therefrom on the side opposite the core member.

~~12~~9. The sheet of claim 1 arranged in substantially planar form.

~~13~~10. A plurality of sheets of claim ~~12~~ 9 arranged in a stack.

~~14~~11. The sheet of claim 1 wound upon itself into roll form.

~~15~~12. A process for making a sheet comprising:

(1) providing a core member comprising a multilayer optical film having one or more layers and having a first major surface;

(2) forming a footing layer on at least a portion of the first major surface, wherein the footing layer is viscoelastic and has a T_g that is lower than either the T_g or the T_m of the polymer at the first major surface of the core member and wherein the footing layer is from about 0.5 to about 3 microns thick;

(3) applying a binder layer composition comprising a film forming polymer and particles to the surface of the footing layer; then

(4) tentering the assembly under sufficient heat to soften the footing layer such that the particles sink into the footing layer, the footing layer, binder layer, and particles constituting a slip control layer, wherein the average diameter of the particles is greater than the combined thickness of the footing layer and binder layer such that the particles protrude from the surface of the slip control layer opposite the core member.

~~16. The process of claim 15 wherein the core member comprises multilayer optical film.~~

~~17~~13. The process of claim ~~15~~ 12 wherein the footing layer and core member are formed simultaneously via coextrusion.

~~18~~14. The process of claim ~~15~~ 12 wherein the footing layer is amorphous.

~~19~~15. The process of claim ~~15~~ 12 wherein the footing layer has a T_g of at least about 85°C.

~~20. The process of claim 15 wherein the footing layer is from about 0.5 to about 3 microns thick.~~

~~21~~16. The process of claim ~~15~~ 12 wherein the binder layer composition comprises a film forming component, particles, and water.

~~22~~17. The process of claim ~~15~~ 12 wherein the binder layer composition is applied to the surface of the footing layer and self-levels.

~~23~~18. The process of claim ~~15~~ 12 wherein the binder layer composition is at least partially dried before tentering.

~~24~~19. The process of claim ~~15~~ 12 wherein the binder layer after tentering is from about 100 to about 500 nanometers thick.

~~25~~20. The process of claim ~~15~~ 12 wherein the binder layer composition further comprises one or more additives selected from the group consisting of leveling agents, fire retardants.

~~26~~21. The process of claim ~~15~~ 12 wherein the binder layer composition is dried to form a film with an array of the particles therein.

~~27~~22. The process of claim ~~15~~ 12 wherein a mean particle diameter of the particles is from about 2 to about 30 microns.

~~28~~23. The process of claim ~~15~~ 12 wherein some particles sink into the footing layer so far as to contact the first major surface of the core member

~~29~~24. The process of claim ~~15~~ 12 further comprising arranging a plurality of the sheets in a stack wherein each sheet is arranged in substantially planar form.

~~30~~25. The process of claim ~~15~~ 12 further comprising winding the sheet upon itself into roll form.

~~31~~26. The process of claim ~~15~~ 12 wherein said winding is pack winding wherein the rolled sheet is pressed against a back up roller when wound upon the jumbo to reduce the amount of entrained air.