

more difficult to remove excess comonomer from the final comonomer. There is therefore a trade off between polymer properties such as transparency and impact strength and the cost of polymer and film production.

SUMMARY

In a first aspect, there is provided a film, comprising:

a low density polyethylene (LDPE)

and

an interpolymers of ethylene and 3-methyl-1-butene,

wherein said interpolymers is prepared using a catalyst system comprising a

metallocene-containing catalyst system,

wherein the film having a haze according to ASTM D 1003 of less than 12 %

and wherein the film having a puncture resistance according to ASTM D5748 of at least

1.75 N/ μ m.

In a second aspect, there is provided the use of a film comprising: a low density polyethylene

(LDPE) and

an interpolymers of ethylene and 3-methyl-1-butene,

wherein said interpolymers is prepared using a catalyst system comprising a

metallocene-containing catalyst system,

in at least one of the following applications:

shipping sacks, heavy duty shipping sacks (HDSS), stretch hoods, stretch wraps, liners,

industrial shrink film, building and constructing films, air and moisture membranes,

barrier films, geomembranes, agricultural films,

wherein the film having a haze according to ASTM D 1003 of less than 12 %

and wherein the film having a puncture resistance according to ASTM D5748 of at least

1.75 N/ μ m.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 shows dart drop (film impact strength) plotted versus film stiffness.

Figure 2 shows puncture strength plotted versus film stiffness.

Figures 3 and 4 show haze and gloss plotted against film stiffness.

Figure 5 shows minimum fusion temperature plotted against film stiffness.

DETAILED DESCRIPTION OF THE INVENTION

Accordingly there remains a need for polymer films that are suitable for making packaging items such as laminate films and bags or sacks with an appropriate combination of optical properties, especially transparency and gloss, and mechanical properties, in particular impact strength. As always there is also a need for the film to be capable of being manufactured cost effectively. Since the margins on many packaging products are small, it is important that packaging costs are kept to a minimum.

It has now been surprisingly found that films comprising an interpolymers of ethylene and a 3-substituted C_{4-10} alkene, wherein said interpolymers is made using a catalyst system comprising a single site catalyst, have excellent optical properties as well as high impact strength. More specifically it has been unexpectedly found that such interpolymers yield films having optical properties that are better than those of conventional ethylene/1-octene copolymers and comparable, or in some cases, of increased impact strength and of unique puncture resistance. At the same time, the interpolymers and therefore films are cheaper to prepare than corresponding ethylene/1-octene copolymers. In other words, the films of the present invention possess a very attractive balance of properties and may be produced cost efficiently.

Films comprising an interpolymers of ethylene and a 3-substituted C_{4-10} alkene have been generically disclosed in the background art but it has never been realized before that a polyethylene interpolymers with a 3-substituted C_{4-10} alkene would provide film with such an advantageous combination of low haze, high gloss and high impact strength. WO2008/006636, for example, discloses copolymers of ethylene and