CLAIMS

1. A method for forming and adhering an entrained polymer structure to a substrate, comprising the steps of:

a. extruding an entrained polymer composition in molten form, wherein the entrained polymer composition comprises a mixture of a base polymer and a particulate active agent;

b. providing a substrate having a surface for receiving application of the entrained polymer composition, and

c. applying the entrained polymer composition in molten form in a predetermined shape to the surface of the substrate to form thereon a solidified entrained polymer structure, wherein the entrained polymer composition adheres to the part of the surface of the substrate by thermal bonding, wherein the entrained polymer structure is formed upon cooling and solidification of the entrained polymer composition,

wherein the method is carried out using a hot melt dispensing apparatus comprising:

i. an extruder for blending and melting the entrained polymer composition and providing a flow of the entrained polymer composition in molten form through the apparatus;

ii. a hose having an internal lumen in fluid communication with an exit of the extruder to receive the flow of the entrained polymer composition in molten form; and

iii. an applicator in fluid communication with the hose, the applicator comprising a dispenser for dispensing the molten entrained polymer composition,

wherein the lumen terminates at the applicator to which the entrained polymer composition in molten form is conveyed through the hose, and wherein the dispenser applies the entrained polymer composition in molten form to the surface of the substrate in the predetermined shape, wherein the lumen is heated as the entrained polymer composition is conveyed through the hose to the dispenser to maintain the molten form of the entrained polymer composition, wherein the dispenser is heated to maintain the molten form of the entrained polymer composition for applying to the surface of the substrate and to facilitate precise formation of the entrained polymer composition into the predetermined shape.

~~the solidified entrained polymer structure comprising an outer boundary, the surface of the substrate extending outwardly beyond the outer boundary.~~

2. A method for forming and adhering an entrained polymer structure to a substrate, comprising the steps of:

a. extruding an entrained polymer composition in molten form, wherein the entrained polymer composition comprises a mixture of a base polymer and a particulate active agent;

b. providing a substrate, which is in solid form, having a surface for receiving application of the entrained polymer composition, and

c. applying the entrained polymer composition in molten form in a predetermined shape to the surface of the substrate to form thereon a solidified entrained polymer structure, wherein the entrained polymer composition adheres to

the surface of the substrate by thermal bonding, wherein the entrained polymer structure is formed upon cooling and solidification of the entrained polymer composition, the solidified entrained polymer structure comprising an outer boundary, the surface of the substrate extending outwardly beyond the outer boundary,

wherein the method is carried out using a hot melt dispensing apparatus comprising an extruder which conveys the entrained polymer composition in molten form to a dispenser that applies the entrained polymer composition in molten form to the surface of the substrate, the dispenser comprising a valve that alternates between a closed state and an open state so as to precisely form the entrained polymer composition in the predetermined shape.

~~2~~3. The method of claim ~~1~~2, wherein the surface of the substrate extends outwardly beyond the outer boundary in all directions.

~~3~~4. The method of claim 1 or 2, wherein the entrained polymer composition comprises a channeling agent, the solidified entrained polymer structure comprising passages formed of the channeling agent that penetrate through the base polymer.

~~4~~5. The method of claim 1 or 2, wherein the substrate is a foil and the surface of the substrate comprises is a polymer sealing layer on the foil.

~~5~~6. The method of claim 1 or 2, the entrained polymer comprising a flow agent selected from the group consisting of: a polyolefin, a polyolefin derivative, a natural wax, a synthetic wax, polyethylene, polyethylene derivatives, ethylene bis(stearamide), and cetyl palmitate.

~~6~~7. The method of claim ~~1~~2, wherein the particulate active agent is present in a range of from 30% to 60% by weight with respect to the total weight of the entrained polymer composition.

~~7~~8. The method of claim ~~1~~2, wherein the particulate active agent is a molecular sieve, which is present in a range of from 20% to 80% by weight with respect to the total weight of the entrained polymer composition.

~~8~~9. The method of claim ~~1~~2, wherein the particulate active agent is a silica gel, which is present in a range of from 20% to 80% by weight with respect to the total weight of the entrained polymer composition.

~~9~~10. The method of claim ~~1~~2, wherein the ~~method is carried out using a~~ hot melt dispensing apparatus comprising:

i. ~~an~~ the extruder for blending and melting the entrained polymer composition and providing a flow of the entrained polymer composition in molten form through the apparatus;

ii. a hose having an internal lumen in fluid communication with an exit of the extruder to receive the flow of the entrained polymer composition in molten form; and

iii. an applicator in fluid communication with the hose, the applicator comprising ~~a~~ the dispenser for dispensing the molten entrained polymer composition,

wherein the lumen terminates at the applicator to which the entrained polymer composition in molten form is conveyed through the hose. ~~, and wherein the dispenser applies the entrained polymer composition in molten form to the surface of the substrate in the predetermined shape.~~

~~10~~11. The method of claim ~~9~~10, wherein the lumen is heated as the entrained polymer composition is conveyed through the hose to the dispenser to maintain the molten form of the entrained polymer composition.

~~11~~12. The method of claim ~~9~~10, wherein the dispenser is heated to maintain the molten form of the entrained polymer composition for applying to the surface of the substrate and to facilitate precise formation of the entrained polymer composition into the predetermined shape.

~~12~~13. The method of claim ~~9~~1, the dispenser comprising a valve that alternates between a closed state and an open state so as to precisely form the entrained polymer composition in the predetermined shape.

~~13~~14. The method of claim ~~1~~2, wherein the solidified entrained polymer structure is in the form of a film having a thickness of from 0.1 mm to 1.5 mm, the substrate is a foil and the surface of the substrate is a polymer sealing layer on the foil.

~~14. The method of claim 1, wherein the method is carried out using a hot melt dispensing~~

~~apparatus comprising an extruder which conveys the entrained polymer composition in molten form to a dispenser that applies the entrained polymer composition in molten form to the surface of the substrate, the dispenser comprising a valve that alternates between a closed state and an open state so as to precisely form the entrained polymer composition in the predetermined shape.~~

~~15. The method of claim 14, wherein the solidified entrained polymer structure is in the form of a film having a thickness of from 0.1 mm to 1.5 mm, the substrate is a foil and the surface of the substrate is a polymer sealing layer on the foil.~~

~~16~~15. The method of claim ~~15~~14, wherein the particulate active agent is a molecular sieve which is present in a range of from 30% to 60% by weight with respect to the total weight of the entrained polymer composition.

~~17~~16. A ~~composite~~ method for manufacturing a composite using method of claim 15,~~made according to the method of claim 16,~~ the composite comprising the entrained polymer structure and the substrate to which the entrained polymer structure is adhered.

~~18~~17. A method for manufacturing a package using the method of claim 16.
~~package comprising the composite of claim 17.~~

~~19~~18. The method of claim 17, ~~package of claim 18,~~ wherein the package is a pouch for a moisture-sensitive product.

~~20~~19. The package of claim ~~18~~17, wherein the package is a blister pack.

20. A method for repeatedly forming and adhering precisely shaped entrained polymer structures to a substrate in an automated package production line, the method comprising the steps of:

a. extruding an entrained polymer composition in molten form using an extruder of a hot melt dispensing apparatus, the extruder being in fluid communication with an applicator comprising a dispenser for dispensing the entrained polymer composition in molten form onto the substrate, the dispenser comprising a valve, the hot melt dispensing apparatus further comprising one or more hoses, each having an internal lumen in fluid communication with an exit of the extruder to receive the flow of the entrained polymer composition in molten form, the lumen terminating at the applicator to which the entrained polymer in molten form is conveyed, wherein the entrained polymer composition comprises a mixture of a base polymer and a particulate active agent;

b. advancing the substrate so as to position the substrate, which is in solid form, beneath the dispenser, the substrate having a surface comprising a polymer sealing layer for receiving application of the entrained polymer composition in molten form;

c. while the substrate is beneath the dispenser, depositing the entrained polymer composition in molten form in a predetermined shape onto the surface of the substrate, wherein the predetermined shape of the entrained polymer composition in molten form adheres to the polymer sealing layer by thermal bonding, forming an entrained polymer structure in a precise shape upon cooling and solidification of the entrained polymer composition, wherein the valve alternates between a closed state and an open state so as to precisely and repeatedly form each entrained polymer structure in the predetermined shape; and

d. repeating steps (b) and (c) so as to form and adhere additional entrained polymer structures, each in the precise shape, to the substrate in the automated package production line.

21. The method of claim 20, wherein each predetermined shape of entrained polymer composition in molten form is provided in the same amount and configuration as another so as to render each entrained polymer structure to be the same size and shape as another.

22. The method of claim 21, wherein the particulate active agent is a molecular sieve or silica gel, which is present in a range of from 20% to 80% by weight with respect to the total weight of the entrained polymer composition.

23. The method of claim 21, wherein the solidified entrained polymer structure is in the form of a film having a thickness of from 0.1 mm to 1.5 mm and the substrate is used to form a portion of a pouch or a blister pack.