A traction system that prevents or minimizes horizontal or lateral movement when two surfaces are placed in contact with one another has been discovered. The traction system comprises a first surface having a microreplication surface material applied to the upper surface thereof and a second surface having a microreplication surface material applied to an area thereof that will come in contact with the upper first surface. Footwear and body wear having improved traction have also been discovered. The footwear and body wear comprises microreplication surface material applied thereto. The traction system, footwear, and body wear can be used to prevent or minimize unwanted movement on slippery or wet surfaces, such as a surfboard, boat deck, or other watercraft.
TRACTION SYSTEM AND FOOTWEAR

FIELD OF THE INVENTION

[0001] The invention generally relates to novel footwear or other body wear comprising a traction material attached to a surface thereof, to minimize and/or prevent movement when the footwear or body wear is brought into contact with another surface. The invention also generally relates to a traction system comprising a first and second surface, both having a traction material attached to a portion thereof, such that when the two surfaces are placed in contact with one another, horizontal and/or lateral movement is minimized and/or prevented.

BACKGROUND OF THE INVENTION

[0002] Surfing is a popular water sport requiring, inter alia, a combination of strength, endurance, balance, and agility. Maintaining precise footing (and/or hand) placement between the surfer and the surfboard is essential to control a surfboard on a wave, and therefore essential to successful surfing. Precise and positive control of footing (and/or hand) placement allows a surfer to maintain appropriate surfing positions during riding of the waves, without losing balance. It is therefore most important to a surfer’s performance, to be able to freely maneuver his or her feet on the board without slipping.

[0003] Surfboards are usually constructed from a foam core material reinforced with fiberglass laminate and epoxy resin. Newer advances are utilizing advanced plastics and other exotic materials. A surfboard upper/top surface is substantially flat, and tapers or slopes downward toward the lateral edges. The surfboard’s upper/top surface, coupled with a smooth material surface finish, results in a slick and slippery surface for the surfer, and contributes to many injuries encountered by surfers.

[0004] Over the years, various approaches have been taken to provide suitable frictional contact between the surfboard and the surfer’s feet, to inhibit inadvertent slipping and enhance surfing performance. Examples include: straps, sponges, Velcro™, specially designed shoe clamping systems, etc.

[0005] There are several solutions for increasing traction on a surfboard currently in use. The most popular solution to this problem is the use of surfboard wax. Surfboard wax has been applied to the upper surface of the board to reduce slippage between a surfer’s feet and the surfboard. However there are several problems with using wax.

[0006] First, the effectiveness of the wax as a non-slip agent is climate dependent. Wax is designed for waters of a certain temperature. For example, if a warm weather wax has been applied, and then used in a lower temperature water, the wax will harden, and its effectiveness as a non-slip agent is reduced dramatically. Conversely, if cold weather wax is used in a warmer temperature water, the wax may overly soften, and reduce its resistance capability.

[0007] Second, the surfboard wax’s low melting temperature results in melting when placed in warm environments such as in cars, or on the beach. This melting can lead to damage to automobile interior and exteriors, clothing, surfboard carriers, as well as an increased collection of particulate matter (such as sand, dirt, etc.) in the melted wax.

[0008] Third, through repeated use, the surfboard wax gets in a surfer’s hair, and is a nuisance. The wax should be applied to the surfboard each use for best results. This requires the surfer to have the wax with them (which leads to increased occurrences of melting wax in automobiles), or the surfer has to continually purchase wax just prior to surfing. Periodic replacings are required because the wax tends to melt and rub off. The cost to the surfer, over the lifetime of a surfboard, can be significant.

[0009] An alternate method of improving traction on surfboards has been a physical modification of the upper/top surface of the surfboard itself. Surfboards in the past, have been modified to provide a rough, or a sandpaper like surface, to increase traction. This method however, is discomfiting to the body due to abrasion of the hands, feet and torso of the rider.

[0010] Another method for increasing traction for surfers is the use of footware featuring a hook and loop type of fastener (Velcro™). This method is illustrated in U.S. Pat. No. 4,285,082 (Cox). The fastener is comprised of two components, with respective surface portions that are interlocked with each other. The first facial surface is equipped with a plurality of loop elements and the second facial surface is equipped with hook elements. The interfacing of these elements establishes the fastening relationship.

[0011] In practice, the use of a hook and loop type fastener on the surfboard surface and on foot pieces worn by the surfer, can help the surfer have more secure footing when riding the surfboard in a standing position. This hook and loop system can be of some use in prevention of parallel horizontal movement of the surfer’s feet. This system also creates a substantial resistance to separation of the two surfaces, and requires an activation force to separate them.

[0012] However, there are major problems associated with the use of the hook and loop type systems for increasing traction and eliminating slippage. A surfer is prevented from quickly relocating his feet or shifting weight on the surfboard in response to a changing water profile. The significant resistance to separation and necessity of a sufficient activation force for separation of the two surfaces, prevents a surfer from performing the quick lateral foot movements necessary for complete control of the board. Shifting feet positions on a surfboard is a normal occurrence to maintain a successful ride. More importantly, because a vertical activation force by the rider is necessary to release the hook and loop bond (i.e., pulling the user’s foot away from the board during the ride), this shift in vertical weight creates instability in the board. Therefore, because the hook and loop system prevents the necessary movement on the board, it is not widely used in the surfing industry.

[0013] Another popular type of traction enhancement device is the non-slip pad. These systems use a sponge-type interaction to give resistance to slip. Most are shaped with upper surface contours and have variable heights to obtain optimal performance. Such as system is disclosed by U.S. Pat. No. 5,435,765 (Fletcher). This system has multiple pad members; each member has a top surface, a bottom surface and raised elements extending from the top surface. The bottom surface of each pad member has an adhesive coating that is attached to the upper surface of the surfboard. The pad systems are used primarily for back foot traction primarily, and wax is utilized for the remainder of the board areas.
Although various methods are currently used to increase traction between a surfboard and a surfer’s feet, none of these methods have been able to solve the problem of slippage without interfering with the surfer’s mobility and performance on the board.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide footwear or other body wear that increases the traction between the wearer’s feet and/or body and a surface, preferably without affecting the ability of the wearer to make movements of the foot and/or body when necessary. The increased traction minimizes and/or prevents lateral movement or slippage when the wearer comes in contact with a slippery and/or wet surface.

One embodiment of the present invention is a foot piece having a micropelliculation surface material (“MSM”) applied to the bottom surface thereof. The foot piece may preferably have a plurality of flexible components, including, but not limited to, a plurality of loop elements or any other means used to keep the wearer’s foot in place with respect to the foot wear, and a flat lower surface, or sole, for support of the wearer’s foot.

Another embodiment of the invention is body wear having a MSM applied to a surface thereof. The body wear may be, but is not limited to, shirt skins, gloves, hand grips, wetsuits and other swimwear. For example, the invention includes a shirt skin having MSM attached to the front surface thereof so as to aid the wearer in paddling and other activities on a surfboard or other watercraft surface. The invention also includes gloves or hand grips having MSM attached to their palm side surface so as to aid wearer in paddling and other activities on a surfboard or other watercraft surface.

In another embodiment of the present invention, a traction system that prevents or minimizes horizontal movement when two surfaces are placed in contact with one another is provided. The traction system comprises a first surface having a MSM applied to the upper surface thereof and a second surface having a MSM applied to area thereof that will come in contact with the upper first surface, such that when the first surface and second surface are placed in contact with one another horizontal movement is minimized or prevented.

The MSM can be applied to a portion of the surface or to the entire surface by any means suitable for attachment of the MSM to the surface, such as, for example, by way of an adhesive material (such as glue), rivets or by sewing the MSM onto the surface. Further, the MSM may be in any form or shape that will fit onto a portion of or the entire surface, such as, for example, strips of MSM. Suitable MSM includes any pliable, water-resistant high-friction, non-PVC elastomeric thermoplastic material, having on its gripping face, numerous, small, micron-sized vertical structures. The MSM of the present invention, is preferably gReptile™ made by 3M (3M Inc., St. Paul, Minn. 55144).

The first surface may be any surface that is slippery or becomes slippery when it becomes wet, for example, surfboards, boat decks, jet skis or other water craft surfaces, and skateboards. The second surface may be any surface that would come into contact with the first surface, for example, any type of footwear, outerwear, clothing or swimwear, for example, foot pieces, shirtskins, pants, gloves, hand grips, bathing suits and wet suits.

Thus, the traction system may comprise, for example, a surfboard having MSM attached to a portion of the upper surface thereof and foot piece having MSM attached to the bottom portion thereof. When the surfboard and foot piece are brought into contact horizontal movement is minimized or prevented. Optimally, no activation force will be necessary to separate the foot piece from the surfboard.

The traction system could also comprise, for example, a boat deck having MSM applied to the surface thereof and footwear having MSM applied to a bottom portion thereof such that traction is increased when the wearer of the footwear is walking or running on the boat deck.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described with reference to the accompanying drawings, wherein:

FIG. 1 shows a side view of the foot piece in accordance with the preferred embodiment of the invention.
FIG. 1A shows a rear corner view of the foot piece in accordance with the preferred embodiment of the invention.
FIG. 2 shows top view of the foot piece in accordance with the preferred embodiment of the invention.
FIG. 2B shows opposite side view of the foot piece in accordance with the preferred embodiment of the invention.
FIG. 3 shows a bottom view of the base member or sole of the foot piece illustrating the placement of the MSM pieces on the foot piece.
FIG. 4 is a top view of the upper surface of a typical surfboard illustrating the placement of the MSM.
FIG. 5 is a view of the foot piece and surfboard system illustrating the preferred embodiment of the invention.

PREFERRED EMBODIMENTS OF THE INVENTION

The invention will now be described in more detail by way of example with reference to the embodiment shown in the accompanied figures. It should be kept in mind that the following described embodiment(s) is only presented by way of example and should not be construed as limiting the inventive concept to any particular physical configuration.

FIG. 1 shows a side view of the foot piece according to the preferred embodiment of the present invention. Generally, the foot piece shown comprises a base member (110) or sole for support of the bottom of a surfer’s foot. This base member (110) is made of a flexible material. The base member (110) further includes a front and rear portion. Attached to both the front and rear portion of the base member is a strapping system for holding a foot in position. Attached to the rear of said base member (110) are two polypropylene ankle straps (112) having a top and bottom.
portion. In the preferred embodiment, these straps (112) are stitched to the base member at the bottom of the straps (112). However, other various conventional methods, such as riveting, may be used to secure the bottom of the ankle straps (112) to the base member or sole (110). In the preferred embodiment the ankle straps (112) are also attached to a triangle aperture (114) which serves as a connecting means to other parts of the system. In other embodiments, a loop, ring or other similar connecting means may be used. The ankle straps (112) have an interior side and exterior side (128 & 130).

[0033] The rear strapping system includes two front straps (120) for retaining the front of the foot on the base member (110). The front strips (120) may be adjustable lengthwise by a buckle or other elements, to accommodate feet of different sizes. In the preferred embodiment, the buckle is a side lock system having a male and female locking system. (122 & 124). Said front strap (120) includes loop stitching (118), a sliding adjustable fabric (126), an interior side and exterior side (128 & 130) and the side lock adjustable buckle (122 & 124). The interior side (128) of the front strap (120) is preferably constructed of a flexible and relatively soft material, so as not to rub the wearer’s foot. Further the exterior side (130) of the front strap (120) is preferably manufactured of durable waterproof material. The front strap is attached to the base member through the connection means. In the preferred embodiment, the front strap is attached to said triangle aperture (114) at each side of the foot.

[0034] The rear strapping system includes a rear strap (116) to hold the back of a surfer’s foot and heel in position. This rear strap (116) also has an interior and exterior side (128 & 130) similar to said sides of the front strap (120). The rear strap (116) is also attached to the connection means. In the preferred embodiment, the rear strap is connected to the triangle aperture (114) at each side of the foot. It is contemplated that in the preferred embodiment of the invention, any and all of the straps are adjustable in length using the side locking adjustable buckle or similar means.

[0035] The foot piece is also comprised of a front strapping system as shown in FIGS. 1B, 2A and 2B. The front strapping system is designed to keep the surfer’s toes in position. The front strapping system is comprised of a strap on the interior of the large toe (131), a strap through the gap between the large toe and the “second” toe (132), a strap to the exterior of the little toe (133), a strap to the exterior side (134), a strap to the exterior ankle (utilizing a side lock) (135). All of these straps are attached to a common connector (136) on the upper surface of the foot. Additionally a mesh, or other supporting material (137), is used to support the toes of the foot. In an alternate embodiment, an additional interior arch strap may be attached from the common connector to the inside triangle aperture of the foot piece.

[0036] FIG. 3 is a bottom view of the base member or sole (110) according to the preferred embodiment of the invention. A plurality of strips (300) are fixed and attached to the bottom surface portion (310) of the base member or sole (110). Again, the straps may be affixed to the base member in a variety of ways including, but not limited to, gluing, sewing, rivets, etc. The bottom surface of the foot piece (110) is comprised of a thin webbing-like material. A thin webbing-like material is used for comfort and feel. If a more solid sole material is used it will feel to the user to be more like a shoe, than an extension of the users’ feet. Most users will prefer to have as much a foot feel as possible.

[0037] The plurality of strips (300) are comprised of MSM and are sewn for attachment to the bottom surface portion (310) of the base member or sole (110). In a preferred embodiment, this material is comprised of 3M gReptileTM material. The plurality of strips (300) can also be attached to the foot piece by various means, adhering with adhesive onto the bottom surface or by any other practical process. Placement of the individual strips (300) of MSM throughout the bottom portion (310) of the base member or sole (110) is accomplished to maximize foot ergonomics. The placement of the strips can be also adjusted. Furthermore, the size and shapes of the plurality of strip (300) can be varied in the width or length to fit the size of the foot piece to be made. The plurality of strips (300) can be die-cut, scissor-cut, stamped, or Gerber cut as is practical or economical.

[0038] FIG. 4 shows a top view of the surface of a typical surfboard. A plurality of strips (400) comprised of MSM are similarly placed on the surface (410) of a surfboard. Said strips (400) can be coated with a variety of adhesives, and attached to the top surface (410) of said board. Said strips are then positioned where a surfer would normally place his feet on the board. Said strips (400) can also be attached by any practical means for attachment. In a preferred embodiment, the MSM is 3M gReptileTM.

[0039] FIG. 5 illustrates the surfboard system and foot piece as said foot piece is brought into contact with the surfboard in accordance with the preferred embodiment of the invention. The foot piece (100) comprising the plurality of strips (hidden from view) having 3M gReptileTM or other MSM type material, is brought in contact with the top surface (410) of the surfboard containing the plurality of strips (400) having said 3M gReptileTM material. The contact of the two pieces causes the material’s grip strength to increase due to interaction of the two MSM surfaces, which minimizes or eliminates horizontal or lateral movement of the foot of the wearer on the surfboard surface. The inset (420) shows a schematic of one possible aspect of the interaction of the two MSM surfaces, when in contact with each other.

[0040] In the preferred embodiment, the MSM is comprised of 3M gReptileTM. The 3M gReptileTM material has microreplicated gripping finger microstructures. When both the plurality of pieces or strips (400) comprising said material are brought in contact with each other, these microstructural gripping fingers mesh with each other, and prevent horizontal movement. The 3M gReptileTM material’s resistance to horizontal movements increase when submerged in water. Therefore, the interlocking bond between the foot piece and board is maintained or increased during its use in wet conditions, unlike conventional traction increasing methods, whose strength are decreased when wet.

[0041] In a preferred embodiment of the present invention, a surfer can have better traction between the surfboard and surfer’s feet. The increased traction allows for greater control of the surfboard without affecting the quality of the ride. Further, the present invention allows the surfer to reposition his feet without worrying about slipping, or requiring a separation force from the traction element. Lessening of foot
pressure during the ride is sufficient to disengage the surfaces of the material from each other, and in the preferred embodiment, discontinues the mesh of the gripping fingers of the 3M gReptile™ material. This allows a rider to repose his or her feet without altering the center of balance with a lift force which would be necessary if using a hook and loop or other traction means when separating from the board’s surface.

In an alternate embodiment of the invention, pieces or strips of MSM are attached to the front of a surfer’s shirt skin. A shirt skin is a tight fitting shirt-like piece of body wear made of a water resistant material. They frequently cover the neck to the waist and come in either short or long sleeve. In a preferred embodiment, the MSM is attached to the front of the skin in vertical strips that grip the MSM of a surfboard or other surface having a MSM. This will increase the traction during paddling, and other various maneuvers.

In another alternate embodiment, pieces or strips of MSM are attached to body wear such as a glove or hand grip. The MSM is attached to the palm side of the glove or hand grip to facilitate maneuvers that require hand grip. In preferred embodiments, strips of 3M gReptile™ material are attached to the front of the shirt skin and the palm side of the hand grips. The strips of 3M gReptile™ material on the shirt skin and hand grip, when brought into contact with the top surface (310) of the surfboard, interact, and prevent horizontal or lateral movement, similar to the preferred embodiment, when the foot piece is brought into contact with the surfboard when the surfer is in a standing position.

In another embodiment of the invention, one piece or a plurality or pieces or strips of MSM are attached to the bottom soles of booties or slip-on shoes for uses in water sports and other activities in water such as fishing. Further, pieces or strips of MSM are placed on any wet or slick surface. In this embodiment, MSM, such as 3M gReptile™, increases the traction between said slick surface and the soles of the slip-on shoes. This is especially useful for fisherman on docks, and would allow said fisherman to walk on the edges of the docks without slipping.

[0045] In yet another embodiment of the invention, pieces or strips of MSM are positioned and attached onto the top surface of a boat, such as a deck. The MSM is strategically positioned near the edges of the boat, or on areas such as the foredeck of a sailboat, gaff section of fishing boats, and other areas requiring increased traction. The edges are more likely to become wet and slick. Material such as 3M gReptile™, increases the traction between the boat and a foot piece. Strips of 3M gReptile™ material is then be placed on the bottom soles of sailor/fisherman’s shoe. Once the feet came into contact with the surface of the boat containing the 3M gReptile™ material, the two portions of the material create a bond and prevent slipping and horizontal movement, and allow for sailors to move around a wet boat more safely.

Although the foregoing described the invention with preferred and alternate embodiments, this is not intended to limit the invention. Rather, the foregoing is intended to cover all modifications and alternative constructions and uses falling within the spirit and scope of the invention as expressed in the appended claims.

What is claimed is:

1. A traction system that minimizes or prevents horizontal movement of a second surface when a first and second surface are in contact, comprising:
   a. a first surface having microplication surface material applied to the upper surface thereof; and
   b. a second surface comprising microplication surface material applied to an area thereof that will come in contact with the upper surface thereof.

2. The traction system according to claim 1, wherein said second surface is selected from the group consisting of: a foot piece, a shirt skin, a hand grip, and a glove.

3. The traction system according to claim 2, wherein said second surface is a shirt skin having microplication surface material attached to the front side of said shirt skin.

4. The traction system according to claim 2, wherein said second surface is a hand grip or glove having microplication surface material attached to the palm side surface thereof.

5. The traction system according to claim 2, wherein said second surface is a foot piece having microplication surface material attached to the sole of the foot piece.

6. The traction system according to claim 1, wherein said first surface is selected from the group consisting of: a surfboard, a deck of a boat or other watercraft, a jet ski, and skateboards.

7. The traction system according to claim 6, wherein said first surface is a surfboard.

8. The traction system according to claim 7, wherein said second surface is a foot piece having microplication surface material attached to the front side of said shirt skin, such that when the upper surface of the surfboard and the front side of the shirt skin are placed in contact, the microplication surface material creates a bond thereby minimizing or preventing horizontal movement of the shirt skin.

9. The traction system according to claim 7, wherein said second surface is a hand grip or glove having microplication surface material attached to the palm side surface thereof, such that when the upper surface of the surfboard and the palm side of the hand grip or glove are placed in contact, the microplication surface material creates a bond thereby minimizing or preventing horizontal movement of the hand grip or glove.

10. The traction system according to claim 7, wherein said second surface is a foot piece having microplication surface material attached to the sole of the foot piece, such that when the upper surface of the surfboard and the sole of the foot piece are placed in contact, the microplication surface material creates a bond thereby minimizing or preventing horizontal movement of the foot piece.

11. The traction system according to claim 6, wherein said first surface is the deck of a boat or other watercraft.

12. The traction system according to claim 1, wherein the microplication surface material is 3M gReptile™ gripping material.

13. The traction system according to claim 2, wherein the microplication surface material is 3M gReptile™ gripping material.

14. The traction system according to claim 3, wherein the microplication surface material is 3M gReptile™ gripping material.

15. The traction system according to claim 4, wherein the microplication surface material is 3M gReptile™ gripping material.
16. The traction system according to claim 5, wherein the microreplication surface material is 3M gReptile™ gripping material.

17. The traction system according to claim 6, wherein the microreplication surface material is 3M gReptile™ gripping material.

18. The traction system according to claim 7, wherein the microreplication surface material is 3M gReptile™ gripping material.

19. The traction system according to claim 8, wherein the microreplication surface material is 3M gReptile™ gripping material.

20. The traction system according to claim 9, wherein the microreplication surface material is 3M gReptile™ gripping material.

21. The traction system according to claim 10, wherein the microreplication surface material is 3M gReptile™ gripping material.

22. The traction system according to claim 11, wherein the microreplication surface material is 3M gReptile™ gripping material.

23. A method of increasing the traction of rider on a surfboard, comprising
   a. applying a microreplication surface material to the upper surface of the surfboard; and
   b. applying a microreplication surface material to an area of a second surface worn by the rider that will come in contact with the upper surface of the surfboard; and
   c. bringing the upper surface of the surfboard in contact with the area of the second surface having the microreplication surface material applied thereto such that a bond is created and horizontal movement is minimized or prevented.

24. The method according to claims 23, wherein the microreplication surface material is 3M gReptile™ gripping material.

25. A foot piece having improved traction when brought in contact with slippery or wet surfaces, comprising a microreplication surface material attached to the sole of the foot piece.

26. The foot piece of claim 25, wherein the microreplication surface material is 3M gReptile™ gripping material.

27. A shirt skin having improved traction when brought in contact with slippery or wet surfaces, comprising a microreplication surface material attached to the front of the shirt skin.

28. The shirt skin of claim 27, wherein the microreplication surface material is 3M gReptile™ gripping material.

29. A hand grip or glove having improved traction when brought in contact with slippery or wet surfaces, comprising a microreplication surface material attached to the front of said hand grip or glove.

30. The hand grip or glove of claim 29, wherein the microreplication surface material is 3M gReptile™ gripping material.