EUROPEAN PATENT SPECIFICATION

Date of publication and mention of the grant of the patent:

Application number: 09751358.4

Date of filing: 19.05.2009

RAZOR BLADE TECHNOLOGY
RASIERKLINGENTECHNOLOGIE
TECHNOLOGIE DE LAME DE RASOIR

Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK TR

Priority: 20.05.2008 US 54563 P

Date of publication of application:
06.04.2011 Bulletin 2011/14

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References cited:

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Description

Background

1. Technical Field

This disclosure relates to razor blades, and more particularly to methods of treating cutting edges of razor blades. 2. Background

Many razor blades for wet shaving razors have their cutting edges treated with a coating such as polytetrafluoroethylene (PTFE) in order to reduce the cutting force required to use the razor blade. A typical PTFE coating is disclosed for example in U.S. A-3,774,703. However, in many instances, the coating applied is too thick for optimal shaving comfort, especially during the first shave. The thick coating on the cutting edge is peeled back during shaving, especially during this first shave. The consequently thinner PTFE coating yields an increased shave performance for the razor blade after the first shave. Accordingly, efforts have been directed towards reliably and reproducibly thinning the blade coating to simulate the effects of the peeled back coating. Examples of methods to achieve a peeled back coating include U.S. A- 5,985,459. and US-B-7,247,249.

US-A-2007/0062047 discloses a razor blade having a cutting edge comprising a polymer film (e.g. PTFE) that can be discontinuous. The film can be a plurality of elongated stripes that extend perpendicular to the cutting edge or can be other patterns provided the pattern allows space for the skin bulge between the coating and the blade.

It is believed the PTFE coating on the cutting edge of a razor blade acts as a hydrophobic layer between the cutting edge and the hair being cut and also between the cutting edge and the skin surface the cutting edge is passing over. In a normal wet shaving operation the inherent hydrophobic nature of the PTFE coating causes a film-like array of water droplets of a microscopic scale to form and be retained on the cutting edge. This film-like array enhances the affect of the normally lubricious PTFE coating to further reduce the aforementioned cutting force.

SUMMARY:

The present disclosure has for its objective to eliminate, or at least substantially alleviate the limitations of the prior art razor blades.

According to the invention, this problem is solved by the subject matter of claim 1. Individual embodiments are the subject matter of the dependent claims.

By applying a surface texture to the cutting edge of a razor blade and/or skin engaging surfaces of the razor cartridge it is possible to lower the friction between these surfaces and corresponding skin and hair surfaces. Furthermore, by applying a suitable coating to the textured surface it is possible to increase the hydrophobicity of the surface.

Surface texturing can be achieved by modification of a surface in an organized pattern or by random roughening of the surface. Surface texturing can be by subtraction from the surface or addition thereto or combinations thereof. Examples of subtraction processes include laser etching. Examples of addition processes include deposition of a material by a sputtering or other suitable vacuum deposition process. Surface texturing can be applied to the substrate or to the hard coating. Surface texturing can also be applied to the outer surface of a hard coating applied to the substrate. Surface texturing can also be applied to the outer surface of a lubricious coating applied to the substrate or to the hard coating. Surface texturing can also be applied to the skin engaging surfaces of the razor cartridge housing.

One advantage of the present disclosure lies in that the cutting edge thus textured has increased hydrophobicity and decreased friction relative to the hair being cut during a normal shaving operation thus decreasing the force required to cut the hair resulting in a more comfortable shave for the user.

The above features and advantages of the present disclosure will be more fully understood with reference to the following detailed description when taken in conjunction with the accompanying drawings.

Detailed Description:

Referring now to the drawings and in particular Fig. 4, an exemplary razor cartridge 10 is depicted. The...
Referring now to Figs. 1 and 2, enlarged views of PTFE.

The blade 50 includes a substrate that has a tip 72 and adjacent facets 74 and one or more coatings 80 that are well known in the art such as alpha-diamond or DLC and can have an outer coating 82 of PTFE. However, the surface texturing can be omitted from one or more surfaces, e.g. the surfaces of the substrate.

Surface texturing can also be by combinations of the aforementioned features adjacent to or superimposed on one another.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. For instance, modifications or changes as can be made within the scope of the attached claims and features disclosed in connection with any one embodiment can be used alone or in combination with each feature of the respective other embodiments. Thus, the breadth and scope of any embodiment should not be limited by any of the above described exemplary embodiments, but should be defined only in accordance, with the following claims.

Claims

1. A razor blade, comprising:
   - a substrate (70) with a cutting edge (60) defined by a tip and adjacent facets (74),
   - a layer (80) of a coating on the cutting edge (60),
   - characterized in that one of the cutting edge (60) and the layer (80) of a coating includes a textured surface including a pattern of elements (110,120,210,310) having a height at least about 5 nm.

2. The razor blade of claim 1, wherein the pattern of elements (110,120,210,310) is one of a random pattern and a regular pattern, and combinations thereof.

3. The razor blade of claim 2, wherein the pattern of elements (310) includes a series of elongated elements.

4. The razor blade of claim 3, wherein the elongated elements (301) extend in a direction parallel to the cutting edge (60).

5. The razor blade of claim 3, wherein the elongated elements (310) extend in a direction that is not in a direction of movement of the razor blade against the skin surface being shaved.
6. The razor blade of any of claims 2 to 5, wherein each element (110,120,210,310) of the pattern of elements is spaced at least 10 nm from the next adjacent element.

7. The razor blade of any of claims 1 to 6, wherein the cutting edge includes an outer layer (82) of polytetrafluoroethylene.

**Patentansprüche**

1. Rasierklinge mit:
   - einem Substrat (70) mit einer Schneidkante (60), die spitz ist und durch angrenzende Facetten (74) definiert ist,
   - einer Beschichtungslage (80) auf der Schneidkante (60),
   - durch gekennzeichnet, dass die Schneidkante (60) oder die Beschichtungslage (80) eine texturierte Fläche mit einem Muster aus Elementen (110, 120, 210, 310) aufweist, die eine Höhe von mindestens ungefähr 5 nm haben.

2. Rasierklinge nach Anspruch 1, bei der das Muster aus Elementen (110, 120, 210, 310) ein zufälliges Muster oder ein regelmäßiges Muster oder eine Kombination aus diesen ist.


4. Rasierklinge nach Anspruch 3, bei der sich die langen Elemente (310) in einer parallel zur Schneidkante (60) verlaufenden Richtung erstrecken.

5. Rasierklinge nach Anspruch 3, bei der sich die langen Elemente (310) in einer Richtung erstrecken, die nicht in einer Richtung der Bewegung der Rasierklinge gegen eine momentan rasierte Hautfläche verläuft.

6. Rasierklinge nach einem der Ansprüche 2 bis 5, bei der jedes Element (110,120,210,310) des Musters aus Elementen in einem Abstand von mindestens 10 nm von dem nächstbenachbarten Element angeordnet ist.

7. Rasierklinge nach einem der Ansprüche 1 bis 6, bei der die Schneidkante eine Außenschicht (82) aus Polytetrafluorethen aufweist.

**Revendications**

1. Lame de rasoir, comprenant :
   - un substrat (70) avec un bord coupant (60) défini par une pointe et des facettes adjacentes (74),
   - une couche (80) d’un revêtement sur le bord coupant (60),
   - caractérisée en ce que l’un du bord coupant (60) et de la couche (80) d’un revêtement comprend une surface texturée comprenant un motif d’éléments (110, 120, 210, 310) ayant une hauteur d’au moins environ 5 nm.

2. Lame de rasoir selon la revendication 1, dans laquelle le motif d’éléments (110, 120, 210, 310) est l’un parmi un motif aléatoire et un motif régulier, et des combinaisons de ceux-ci.

3. Lame de rasoir selon la revendication 2, dans laquelle le motif d’éléments (310) comprend une série d’éléments allongés.

4. Lame de rasoir selon la revendication 3, dans laquelle les éléments allongés (301) s’étendent dans une direction parallèle au bord coupant (60).

5. Lame de rasoir selon la revendication 3, dans laquelle les éléments allongés (301) s’étendent dans une direction qui n’est pas dans une direction de déplacement de la lame de rasoir contre une surface de peau qui est rasée.

6. Lame de rasoir selon l’une quelconque des revendications 2 à 5, dans laquelle chaque élément (110, 120, 210, 310) du motif d’éléments est espacé d’au moins 10 nm de l’élément adjacent suivant.

7. Lame de rasoir selon l’une quelconque des revendications 1 à 6, dans laquelle le bord coupant comprend une couche extérieure (82) de polytétrafluoroéthylène.
FIG. 4

FIG. 5
REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 3774703 A [0002]
- US 5985459 A [0002]
- US 7247249 B [0002]