

CLAIMS

1. An electrosurgical instrument for delivering electromagnetic energy to biological tissue, the instrument comprising:

a distal end assembly comprising:

an active tip comprising a planar body made of a first dielectric material separating a first conductive element on a first surface thereof from a second conductive element on a second surface thereof, the second surface facing in the opposite direction to the first surface;

an electrically conductive protective hull mounted on an underside of the active tip, the protective hull having a smoothly contoured convex undersurface facing away from the planar body; and

a coaxial feed cable comprising an inner conductor, an outer conductor coaxial with the inner conductor and a second dielectric material separating the inner and outer conductors, the coaxial feed cable being for conveying RF EM energy or microwave EM energy,

wherein the inner conductor is electrically connected to the first conductive element and the outer conductor is electrically connected to the second conductive element via the protective hull to enable the instrument tip to receive the RF and/or the microwave signal,

wherein the first and second conductive elements are arranged to emit the RF EM energy or the microwave EM energy from the coaxial cable at a distal side portion of the planar body,

wherein the protective hull is soldered to the second conductive element, wherein the protective hull comprises an upper surface for abutting the second surface of the planar body, and wherein the upper surface comprises a recess for retaining a solder preform.

2. An electrosurgical instrument according to claim 1, wherein the protective hull is formed from a conductive material having a low coefficient of friction with biological tissue.

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3. An electrosurgical instrument according to claim 1 or 2, wherein the protective hull comprises a piece of stainless steel.

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4. An electrosurgical instrument according to claim 1, wherein the recess has side edges that are set back from side edges of the planar body.

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5. An electrosurgical instrument according to any preceding claim, wherein the protective hull has a U-shaped recess for receiving a portion of the outer conductor.

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6. An electrosurgical instrument according to claim 5, wherein the coaxial cable is retained in the U-shaped recess by an interference fit.

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7. An electrosurgical instrument according to claim 5 or 6, wherein the coaxial cable is crimped to cause it to deform within the U-shaped recess.

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8. An electrosurgical instrument according to any preceding claim, wherein the distal end assembly comprises a flexible shaft connected to a proximal end of the protective hull, the shaft defining a lumen for conveying the coaxial cable.

9. An electrosurgical instrument according to claim 8, wherein the flexible shaft comprises:

a proximal cannula tube having braids formed therein to assist in the transfer of torque from its proximal end to the distal end assembly; and

5 a distal unbraided tubular portion bonded to a distal end of the cannula tube.

10 10. An electrosurgical instrument according to claim 9, wherein the flexible shaft comprises a support tube mounted at a junction between the proximal cannula tube and the unbraided tubular portion.

15 11. An electrosurgical instrument according to claim 9 or 10, wherein a junction between the proximal cannula tube and the unbraided tubular portion is wrapped in a heat shrink sleeve.

20 12. An electrosurgical instrument according to any preceding claim, wherein the first and second conductive elements each comprise a layer of metallisation, the layers of metallisation being formed on opposite surfaces of the first dielectric material.

25 13. An electrosurgical instrument according to claim 12, wherein each layer of metallisation comprises a plated region formed from a metal having a melting point higher than 1500°C, such as titanium or tungsten.

30 14. An electrosurgical instrument according to claim 13, wherein the first conductive element comprises a first connecting portion between its plated region and the inner conductor and the second conductive element comprises a second connecting portion between its plated region and the protective hull conductor, wherein the first and second connecting portions are made from a conductive material having

a melting point less than 1200°C.

15. An electrosurgical instrument according to any preceding claim, wherein the distal end assembly includes a
5 fluid feed conduit for conveying fluid for delivery out of the instrument.

16. An instrument according to claim 15, wherein the undersurface of the protective hull has a longitudinally
10 extending recessed channel formed therein, and wherein the fluid feed conduit is mounted within the longitudinally extending recessed channel.

17. An instrument according to claim 15 or 16, wherein
15 the fluid feed conduit comprises a needle guide tube having a retractable needle slidably mounted therein.