CLAIMS

1. An electrosurgical instrument for delivering radiofrequency (RF) electromagnetic (EM) energy and microwave EM energy for resection and ablation of biological tissue, the instrument comprising:

a coaxial transmission line for conveying the RF EM energy and the microwave EM energy, the coaxial transmission line comprising an inner conductive layer, an outer conductive layer and a dielectric layer separating the inner conductive layer from the outer conductive layer; and

a ball-shaped instrument tip at a distal end of the energy conveying cable structure, the instrument tip comprising:

a first conductive hemisphere electrically connected to the inner conductive layer;

a second conductive hemisphere electrically connected to the outer conductive layer; and

a planar dielectric layer located in a physical separation gap between the first conductive hemisphere and the second conductive hemisphere,

wherein the first conductive hemisphere and the second conductive hemisphere are configured to:

radiate the microwave EM energy as a substantially spherical field, and

provide respectively an active electrode and a return electrode on opposing sides of the separation gap for delivering the RF EM energy.

2. An electrosurgical instrument according to claim 1, wherein the ball-shaped instrument tip has a diameter equal to or less than 3 mm.

3. An electrosurgical instrument according to claim 1 or 2, wherein the first conductive hemisphere and the second conductive hemisphere are symmetrically mounted on the planar dielectric layer.

4. An electrosurgical instrument according to any one of claims 1 to 3 including:

a first electrical connector mounted on a first surface of the planar dielectric layer, the first electrical connector electrically connecting the inner conductive layer to the first conductive hemisphere; and

a second electrical connector mounted on a second surface of the planar dielectric layer opposite to the first surface, the second electrical connector electrically connecting the outer conductive layer to the second conductive hemisphere.

5. An electrosurgical instrument according to any one of claims 1 to 4, wherein the coaxial transmission line includes a fluid flow passage for conveying a fluid to the instrument tip.

6. An electrosurgical instrument according to claim 5, wherein the instrument tip includes a fluid flow outlet connected to the fluid flow passage.

7. An electrosurgical instrument according to claim 6, wherein the fluid flow passage is through the planar dielectric layer.