CLAIMS

1. An electrosurgical instrument comprising:

a coaxial feed cable for conveying microwave energy and radiofrequency energy, the coaxial feed cable having an inner conductor, an outer conductor, and a dielectric material separating the inner conductor and the outer conductor; and

a radiating tip disposed at a distal end of the coaxial cable to receive the microwave energy and the radiofrequency energy, the radiating tip comprising:

a longitudinally extending dielectric body;

a distal electrode and a proximal electrode disposed on a surface of the dielectric body, wherein the distal electrode and the proximal electrode are physically separated from each other in the longitudinal direction by an intermediate portion of the longitudinally extending dielectric body; and

a tuning element mounted in the intermediate portion of the longitudinally extending dielectric body and electrically connected to the inner conductor, the tuning element comprising an electrically conductive body mounted within the intermediate portion of the dielectric body,

wherein the distal electrode is electrically connected to the inner conductor,

wherein the proximal electrode being electrically connected to the outer conductor,

wherein the distal electrode and proximal electrode are configured as an active electrode and a return electrode for delivering the radiofrequency energy, and

wherein the radiating tip is operable as an antenna for emitting the microwave energy.

2. An electrosurgical instrument according to claim 1, wherein the distal electrode includes a first conductive ring on the surface of the dielectric body.

3. An electrosurgical instrument according to claim 1 or 2, wherein the proximal electrode includes a second conductive ring on the surface of the dielectric body, and wherein the inner conductor is connected to the distal

electrode via a conductor that passes through the second conductive ring.

4. An electrosurgical instrument according to any preceding claim, wherein the proximal electrode and the distal electrode have the same dimensions.

5. An electrosurgical instrument according to any preceding claim, wherein the outer conductor terminates at the proximal electrode.

6. An electrosurgical instrument according to any preceding claim, wherein the inner conductor extends through the dielectric body, and wherein the inner conductor is electrically connected to the distal electrode by a conductive connection element that extends radially from the inner conductor.

~~7. An electrosurgical instrument according to any preceding claim, wherein the tuning element comprises an electrically conductive body mounted within the intermediate portion of the dielectric body, the electrically conductive body being electrically connected to the inner conductor.~~

7~~8~~. An electrosurgical instrument according to any preceding claim, wherein the electrically conductive body is a sleeve mounted around a portion of the inner conductor that extends into the dielectric body.

8~~9~~. An electrosurgical instrument according to any preceding claim, wherein the tuning element has a longitudinal length less than~~t~~ a longitudinal separation of the distal electrode and the proximal electrode.

9~~10~~. An electrosurgical instrument according to any preceding claim, wherein the dielectric body comprises a protruding portion of the dielectric material that extends beyond a distal end of the outer conductor.

10~~11~~. An electrosurgical instrument according to claim 9~~10~~, wherein the tuning element is mounted within the protruding portion of the dielectric material.

11~~12~~. An electrosurgical instrument according to claim 9~~10~~ or 10~~11~~, wherein the intermediate portion of the longitudinally extending dielectric body comprises a electrically insulating collar mounted over the protruding portion of the dielectric material.

12~~13~~. An electrosurgical instrument according to any preceding claim, wherein outer surfaces of the distal electrode, intermediate portion and proximal electrode are flush along the radiating tip.

13~~14~~. An electrosurgical instrument according to any preceding claim, wherein the tuning element has dimensions selected to introduce a capacitance for improving the coupling efficiency of the antenna.

14~~15~~. An electrosurgical instrument according to any preceding claim, wherein the radiating tip further includes a dielectric choke.

15~~16~~. An electrosurgical system for treating biological tissue, the apparatus comprising:

an electrosurgical generator arranged to supply microwave energy and radiofrequency energy; and

an electrosurgical instrument according to any preceding claim connected to receive the microwave energy and radiofrequency energy from the electrosurgical generator.

16~~17~~. An electrosurgical system according to claim 10~~11~~ further comprising a surgical scoping device having a flexible insertion cord for insertion into a patient’s body, wherein the flexible insertion cord has an instrument channel running along its length, and wherein the electrosurgical instrument is dimensioned to fit within the instrument channel.