CLAIMS

1. An electrosurgical apparatus for performing electrosurgery, the apparatus comprising:

a microwave source arranged to generate microwave electromagnetic EM radiation at a first power;

a probe arranged to deliver the microwave EM radiation at a second power from a distal end thereof for treating biological tissue;

a microwave amplifier mounted in the probe and arranged to amplify the microwave EM radiation from the first power to the second power that is higher than the first power; and

a feed structure for conveying microwave EM energy from a microwave source to the microwave amplifier and to the probe,

wherein the probe is arranged at a distal end of the feed structure, and

wherein the microwave amplifier comprises:

a transistor configured to provide an amplified microwave signal at an output thereof; and

a load network coupled to the output for shaping a waveform of the amplified microwave signal,

wherein the load network comprises:

a fundamental matching network that is tunable to provide impedance matching at the fundamental frequency;

a half-wave transmission line for a second harmonic frequency of the amplified microwave signal, the half-wave transmission line being disposed between the output and the fundamental matching network;

a quarter-wave stub and a five-quarter-wave stub for a third harmonic frequency of the amplified microwave signal arranged on the half-wave transmission line to provide an open circuit condition at the third harmonic frequency; and

a quarter-wave stub for the second harmonic frequency and a quarter-wave stub for the fundamental frequency, arranged on the half-wave transmission line to provide a short circuit condition at the second harmonic frequency.

2. The electrosurgical apparatus according to claim 1, wherein the quarter-wave stub and the five-quarter wave stub

for the third harmonic frequency are arranged to oppose each other at a distance along the half-wave transmission line equal to a quarter-wave for the third harmonic frequency.

3. The electrosurgical apparatus according to claim 1 or claim 2, wherein the quarter-wave stub for the second harmonic frequency and the quarter-wave stub for the fundamental frequency are arranged to oppose each other at an output of the half-wave transmission line.

4. The electrosurgical apparatus according to any preceding claim, wherein a bias voltage is applied to the transistor through the quarter-wave stub for the fundamental frequency.

5. The electrosurgical apparatus according to claim 4, further comprising a capacitor arranged between the bias voltage input and the quarter-wave stub for the fundamental frequency.

6. The electrosurgical apparatus according to any one of the preceding claims, wherein the half-wave transmission line for the second harmonic frequency comprises a quarter-wave transmission line for the third harmonic frequency, the quarter-wave stub and five-quarter-wave stub for the third harmonic frequency being arranged to oppose each other at the output of the quarter-wave transmission line for the third harmonic frequency.

7. The electrosurgical apparatus according to any one of the preceding claims, wherein the transistor is a GaN-based HEMT

8. The electrosurgical apparatus according to any one of the preceding claims, further comprising a direct current (DC) power source for supplying DC energy to the microwave source, wherein the DC power source is integrated with the probe.

9. The electrosurgical apparatus according to any one of the preceding claims, wherein the microwave source is mounted in the probe.

10. The electrosurgical apparatus according to any one of the preceding claims, wherein the apparatus further comprises a scoping device having a body and an instrument cord, wherein an instrument channel extends through the instrument cord, and wherein the probe is insertable through the instrument channel.

11. The electrosurgical apparatus according to any one of the preceding claims, wherein the apparatus further comprises a handle connected to the probe via a flexible shaft.