What is claimed is:

1. A chuck for clamping and heating a workpiece, comprising:
   a housing, formed as a hollow cylinder having sidewalls and an open end, wherein a region inside the sidewalls defines a cavity and the inner diameter of the sidewalls is less than an outer diameter of the workpiece to be clamped such that the workpiece rests on a top surface of the sidewalls and is supported only by the sidewalls;
   a heat source disposed in the cavity; and
   one or more pairs of electrodes disposed on the top surface of the sidewalls.

2. The chuck of claim 1, further comprising a clamp ring disposed on the top surface of the sidewalls.

3. The chuck of claim 2, wherein an inner diameter of the clamp ring is greater than an outer diameter of the workpiece, such that the clamp ring does not cover any portion of the workpiece.

4. The chuck of claim 3, wherein the clamp ring comprises a plurality of tabs that extend inward from the inner diameter, such that the plurality of tabs are disposed above a portion the workpiece and wherein an electrostatic force generated by the one or more electrodes attracts the plurality of tabs toward the top surface.

5. The chuck of claim 4, further comprising downward protrusions disposed on a bottom surface of the plurality of tabs to reduce a contact area between the plurality of tabs and the workpiece.

6. The chuck of claim 3, wherein the inner diameter of the clamp ring is larger than an inner diameter of the sidewalls and smaller than an outer diameter of the sidewalls such that the clamp ring rests on only a portion of the top surface.

7. The chuck of claim 2, wherein an inner diameter of the clamp ring is less than an outer diameter of the workpiece, such that the clamp ring covers a portion of the workpiece

such that the workpiece is disposed between the clamp ring and the top surface and an electrostatic force generated by the one or more pairs of electrodes attracts the clamp ring toward the top surface.

8. The chuck of claim 1, further comprising radiation shields disposed between the housing and the heat source.

9. The chuck of claim 1, further comprising protrusions disposed on the top surface of the sidewalls to reduce a contact area between the housing and the workpiece.

10. The chuck of claim 1, further comprising a thermal sensor and a controller, wherein the controller modifies an output of the heat source based on information from the thermal sensor.

11. The chuck of claim 10, wherein the thermal sensor comprises a pyrometer.

12. The chuck of claim 1, wherein the one or more pairs of electrodes comprise two electrodes that are each provided with a respective bipolar DC signal and the bipolar DC signals are of opposite phase.

13. The chuck of claim 12, wherein voltages supplied by the bipolar power supply comprise an AC voltage or a pulsed DC voltage.

14. The chuck of claim 1, wherein the heat source heats the workpiece using radiative heating.

15. The chuck of claim 1, wherein lift pins and/or ground pins are disposed on the top surface of the sidewalls.

16. The chuck of claim 1, wherein each pair of the one or more pairs of electrodes are in communication with a respective bipolar power supply such that voltages applied to the electrodes in each pair are of opposite polarity.

17. An ion implantation system, comprising:

an ion source; and

an electrostatic chuck, the electrostatic chuck comprising:

a housing, formed as a hollow cylinder having sidewalls and an open end, wherein a region inside the sidewalls defines a cavity and the inner diameter of the sidewalls is less than an outer diameter of the workpiece to be clamped such that the workpiece rests on a top surface of the sidewalls and is supported only by the sidewalls;

a heat source disposed in the cavity; and

one or more pairs of electrodes disposed on a top surface of the sidewalls.