ing a gas exit **615** above the electrodes into a pumping plenum **620**. The pumping plenum is electrically isolated from the plasma volume thereby obviating the possibility of the plasma reforming in this region. This pumping of the gas away from the excitation region obviates the possibility of the etchant gas interacting with the substrate being treated on the reference electrode. It may be necessary in this arrangement where the gas is moved around the electrodes to coat the electrodes with a dielectric material **625** such as silicon dioxide or the like. Such a dielectric coating is shown as defining the exit path for the gas, but the exact extent of the coating could vary depending on application.

[**0028**] It will be appreciated that what has been described herein is a new plasma source which provides for centre-to-edge power deposition by electrode spacing and/or power distribution design and/or active elements such as capacitors and/or inductors so as to provide for a controlled uniformity profile plasma. In certain applications this can require a difference in the profile of the plasma at certain regions of applications, such that specific selected areas are regions of greater plasma deposition as opposed to other. Other applications may require the same profile across the substrate. Although, the electrodes have been described with regard to exemplary embodiments it will be appreciated that the configuration chosen for a specific application can be such so as to have the electrodes arranged on any arbitrary-shape plasma facing element including for example flat, hemispheric, dome, convex, concave, undulating. The electrodes could be in direct contact with the plasma or could alternatively interact with the plasma through a dielectric window provided from materials such as SiN, AlN, SiC, SiO_2, Si etc. The arrangement of the present invention provides a number of distinct advantages over the prior art including:

[**0029**] 1. Compatible with HF+LF independent control of ion energy (E_{ion}) and ion flux (Γ_{ion}).

[**0030**] 2. Controllable T_e is a possibility by allowing for a HF scanning from RF to UHF.

[**0031**] 3. As the individual electrodes making up the reactive element may be dimensioned small, and the dimensions of these can define the plasma volume it is possible to provide a plasma source having a small plasma volume. Any individual non-uniform power coupling from an individual electrode or pair of electrodes does not result in non-uniform plasma density at a large enough distance from the electrodes. Specifically, it will be understood that as each of the individual elements are reduced in size that the distance required within the plasma volume for the overall generated plasma to be equalised is reduced.

[**0032**] 4. The source may be used with substrates of many different dimensions as it may be configured to provide minimal centre-to-edge power deposition effects over an extended area and as such is suitable for large substrates (300 mm wafers, FPD, textiles and the like).

[**0033**] 5. Similarly, the possibility of using high frequency sources is advantageous as one can choose the operational frequency to match the process required, and it is possible to go to higher frequencies than heretofore achievable without introducing plasma non-uniformity.

[**0034**] 6. The source may be used with gas distribution feeds similar to present generation systems or alternatively may be used with a distribution feed that minimizes any interaction between etchant or deposition by-product gas and the substrate material.

[**0035**] 7. Reduced system cost as lower electrode can be grounded. This is particularly advantageous in that there is no longer a requirement to provide a high frequency lower plate, which had the requirement that ancillary equipment needed to be isolated from ground, whereas the configuration of the invention enables the ancillary equipment to be grounded.

[**0036**] 8. Compatible with advanced HF power supply technology and direct-drive switch-mode power, which can provide the necessary frequencies at a lower cost. No HF through lower electrode, so variable gap easier to engineer. As the HF component is applied to the reactive elements solely it is possible to minimize the HF return through chamber body, so unconfined plasma should be less likely to occur. Furthermore, there is no longer the requirement to stringently provide for such HF paths in other components of the chamber.

[**0037**] It will be understood that the invention provides for plurality of physically individually distinct reactive elements with adjacent electrodes being coupled out of phase with one another. It will be appreciated that if two adjacent electrodes are couple in phase with one another that they in effect resemble a physically larger single electrode, and that such a single larger electrode will be out of phase with its immediate neighbours.

[**0038**] The reactive elements of the invention may be provided in any configuration or array structure, for example a 2-D array or linear structure which may, it will be appreciated, be scaled in dimension depending on the application required. It will be appreciated that the configuration of the present invention provides for such scaling while maintaining compatibility with VHF/UHF operation requirements and performance levels.

[**0039**] Therefore although the invention has been described with reference to exemplary illustrative embodiments it will be appreciated that specific components or configurations described with reference to one figure may equally be used where appropriate with the configuration of another figure. Any description of these examples of the implementation of the invention are not intended to limit the invention in any way as modifications or alterations can and may be made without departing from the spirit or scope of the invention. It will be understood that the invention is not to be limited in any way except as may be deemed necessary in the light of the appended claims.

[**0040**] Similarly, the words comprises/comprising when used in this specification are to specify the presence of stated features, integers, steps or components but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

1. A plasma source comprising a plasma excitation region and a plasma exciting reactive impedance element, the source being characterizsed in that the plasma exciting reactive impendence element includes a plurality of electrodes, the electrodes being coupled to a high frequency generator and wherein, in use, on coupling the electrodes to