

Abstract

Systems and Methods for Frequency Modulation of Radiofrequency Power Supply for Controlling Plasma Instability

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A wafer is positioned on a wafer support apparatus beneath an electrode such that a plasma generation region exists between the wafer and the electrode. Radiofrequency signals of a first signal frequency are supplied to the plasma generation region to generate a plasma within the plasma generation region. Formation of a plasma instability is detected within the plasma based on supply of the radiofrequency signals of the first signal frequency. After detecting formation of the plasma instability, radiofrequency signals of a second signal frequency are supplied to the plasma generation region in lieu of the radiofrequency signals of the first signal frequency to generate the plasma. The second signal frequency is greater than the first signal frequency and is set to cause a reduction in ion energy within the plasma and a corresponding reduction in secondary electron emission from the wafer caused by ion interaction with the wafer.

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Fig. 1A