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(19) **United States**(12) **Patent Application Publication****Bhowmick et al.**(10) **Pub. No.: US 2023/0230804 A1**(43) **Pub. Date: Jul. 20, 2023**(54) **PROCESS CONTROL FOR ION ENERGY DELIVERY USING MULTIPLE GENERATORS AND PHASE CONTROL**(71) Applicant: **Lam Research Corporation**, Fremont, CA (US)(72) Inventors: **Ranadeep Bhowmick**, San Jose, CA (US); **Felix Kozakevich**, Sunnyvale, CA (US); **Alexei Marakhtanov**, Albany, CA (US); **John Holland**, Fremont, CA (US); **Eric Hudson**, Fremont, CA (US)(21) Appl. No.: **18/010,204**(22) PCT Filed: **Jul. 6, 2021**(86) PCT No.: **PCT/US2021/040480**

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CPC .. **H01J 37/32165** (2013.01); **H01J 37/32128** (2013.01); **H01J 37/32183** (2013.01); **H01J 2237/3343** (2013.01)(57) **ABSTRACT**

A method for applying RF power in a plasma process chamber is provided, including: generating a first RF signal; generating a second RF signal; generating a third RF signal; wherein the first, second, and third RF signals are generated at different frequencies; combining the first, second and third RF signals to generate a combined RF signal, wherein a wave shape of the combined RF signal is configured to approximate a sloped square wave shape; applying the combined RF signal to a chuck in the plasma process chamber.

