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Effects of pulse modulation on the density distributions of ions and molecules in Ar/H_2 inductively coupled plasma[1] KWON-SANG SEO, DONG-HYUN KIM, HO-JUN LEE, Electrical and Computer engineering, Pusan National University — Pulse modulation operation of inductively coupled plasma(ICP) and microwave plasma is an effective method for controlling plasma chemistry through active utilization of afterglow process and temporal variation of electron energy. In this work, effects of power pulsing on the neutrals and ions chemistry in Ar/H_2 ICP are investigated using 2D fluid simulations. Driving frequency of ICP was 13.56 MHz and pulse frequency was varied from 10 to 20 kHz. The effects of pulse frequency, duty cycle, and gas mixture ratios have been analyzed comprehensively. For comparison with continuous mode, time average power of pulse mode was set equal to the continuous mode. The atomic ions such as Ar^+ and H^+, generated dominantly by electron impact reaction, increase only during the plasma on time. However, dimer and trimer ions like H_2^+, H_3^+ increase rapidly during plasma off time because important generation channels of these ions are gas phase reaction including charge transfer reaction. During the off period, ion flux toward chamber surface remains very low level due to rapid cooling of elections. These variations profoundly affect the density distributions of dimer and trimer ions.

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