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Is particle distribution control necessary in plasma etching processes?[1] M.M. TURNER, B.J. KEVILLE, S. DANIELS, Y. ZHANG, A.M. HOLOHAN, Dublin City University, Ireland — The performance of plasma processes commonly depends on a small number of critical variables. For example, in etch processes employed for semiconductor manufacturing, the crucial variables are often the flux and energy of positive ions and the fluxes of two neutral radicals, for instance fluorine and oxygen. Neutral radical fluxes, in particular, tend to drift, due to factors such as wall condition and disturbance of the process by etch products. Such drifts are highly undesirable and can seriously limit the performance of plasma processes. In principle, process drift of this kind can be mitigated by a closed-loop control scheme, which in practice means that, *inter alia*, the feedstock gas composition is manipulated to compensate for, *e.g.* variations in wall state. However, such a scheme does not control either the electron energy distribution function, the composition of the positive ion flux, or the ion energy distribution function, and all of these things may change when the neutral gas composition changes. In this work we show that these effects may be surprisingly small, and therefore that explicit measures to control these parameters may not be required.

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