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Ion energy distributions in dual frequency RF plasmas PETER HATTON, JOHN REES, SAM BORT, DAVE SEYMOUR, Hiden Analytical Ltd — For many surface-processing applications involving plasmas operated at RF frequencies it has been found helpful to combine two sources of power operating at different frequencies. By choosing suitable input powers at the two frequencies and varying the phase relationship set between the two inputs, the energy distributions (IEDs) for the ions arriving at the target surface can be optimised. There have been, however, only a limited number of published reports of measured or modelled distributions. In the present work IEDs for both positive and negative ions formed in plasmas in argon and nitrous oxide have been measured for mass-identified ions in two different reactors, one of which is a parallel-plate, capacitatively-coupled, system and the other is an inductively-coupled system. Typical data for 13.56 and 27.1 MHz inputs are presented for a range of phase relationships. The IEDs show clearly significant differences between the data for different species of ions which result in part from the ion-molecule collisions occurring, particularly in the plasma/surface sheath regions.

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