Spatial distribution of negative ion density in a reactive dc magnetron determined using laser photodetachment

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The density of negative oxygen ions in the bulk plasma of a reactive dc magnetron has been determined in previous experiments using a combination of laser photodetachment and Langmuir probing [R Dodd, S-D You, et al, Plasma Sources Sci. Technol 19 (2010) 015021]. This diagnostic method has now been used to collect negative ion density data within the bulk plasma, in particular the region in the vicinity of the magnetic null, along with spatially resolved electron temperature, density, ion current and plasma potential in order to plot 2-D distributions of these quantities. The O⁻ density profiles have been compared with computational models [Evi Bultinck, PhD Thesis, Universiteit Antwerpen 2009] of similar magnetron devices operating in reactive mode. The influence of the spatial distributions of negative ions on thin film growth is briefly discussed.

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