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Operation of a Reactive Magnetron Sputtering Ion Source Using Water Vapor Plasma

One of the methods used to produce ions of metals and metal oxides is through extracting them from a magnetron sputtering ion source. In this study, the extraction of ions from a compact, reactive magnetron sputtering source is investigated, with water vapor as reactive gas. The use of water vapor has been shown to improve the film's properties, through the introduction of hydrogen ions. To investigate the role of water vapor and the effect of the different species produced from its dissociation in plasma, the ion energy distribution is measured using a retarding potential analyzer, and the ion species is identified using residual gas analysis in a differentially pumped post-extraction region. The effect of the parameters, such as pressure, discharge current, and gas admixture, as well as the target surface condition, to the extracted ion beams and deposited film are discussed.

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