

Abstract Submitted
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Control of the mechanical stress of AlN coatings using the electrical asymmetry effect in a large-area multi-frequency CCP¹ STEFAN RIES², LARS BANKO, JULIAN SCHULZE³, ALFRED LUDWIG, PETER AWAKOWICZ, Ruhr Univ Bochum, INSTITUTE OF MATERIALS, MATERIALS FOR MICROT TECHNOLOGY TEAM, INSTITUTE OF ELECTRICAL ENGINEERING AND PLASMA TECHNOLOGY TEAM — CCPs are widely used in industrial applications for deposition and etching processes. For sputtering the control of the ion bombardment energy and flux at the target and at the substrate are highly relevant for the deposition of coatings with pre-defined properties. In single frequency CCPs the energies and fluxes of the ions are coupled with each other. Also in classical dual-frequency CCPs (e. g. 2 + 27 MHz) the decoupling of these parameters is limited. Using the Electrical Asymmetry Effect (EAE) a nearly ideal decoupling of the ion energy and flux can be realized, if a fundamental frequency and its second harmonic are used with the relative phase angle between the two phase-locked frequencies as a control parameter. In this work a large-area multi-frequency CCP operated at 13.56 MHz and 27.12 MHz is used to control the mechanical stress of AlN coatings by variation of the ion energy bombardment onto the growing layer based on the EAE. At the same time the ion-to-growth flux ratio is kept constant. The range of ion energy control at the substrate without additional substrate bias as well as the potential of this plasma source for reactive RF sputter deposition of ceramic films are discussed.

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