Abstract Submitted
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A novel large-area sputtering process with tunable coating properties in multi-frequency capacitively coupled plasmas based on the Electrical Asymmetry Effect[1] DAVID SCHULENBERG, STEFAN RIES, PETER AWAKOWICZ, JULIAN SCHULZE, LARS BANKO, ALFRED LUDWIG, Ruhr-University Bochum, DANIEL PRIMETZHOFER, Uppsala University, MARCUS HANS, JOCHEN M. SCHNEIDER, RWTH Aachen University — A large-area multi-frequency capacitively coupled plasma is presented as a novel versatile sputter deposition technique using the electrical asymmetry effect with voltage amplitude adjustment in order to precisely control the ion energy without affecting the ion-to-growth flux ratio. Measurements of the ion energy and ion flux at the substrate with a retarding field energy analyzer combined with the determined deposition rate for an ArN2 plasma at 0.5 Pa show a variation of the mean ion energy within a range that allows the modification of the film characteristics at the grounded electrode, when changing the relative phase shift θ between the applied voltage frequencies, while the ion-to-growth flux ratio can be kept constant. AlN thin films are deposited and exhibit an increase in compressive film stress, hardness and elastic modulus as well as a change of the preferred orientation as a function of the mean ion energy.

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