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Reactive growth of HfN and TiO2 using peak current regulated high-power impulse magnetron sputtering

Tetsuhide Shimizu[1], Michelle Villamayor[2], Daniel Lundin[3], Ulf Helmersson[2]

[1]Tokyo Metropolitan University, Hachiohjishi, Tokyo, Japan [2]IFM Materials Physics, Linköping University, Linköping, Sweden [3]LPGP, Université Paris-Sud,, Orsay Cedex, France

simizu-tetuhide@tmu.ac.jp

A simple and cost effective approach to stabilize the sputtering process in the transition zone during reactive high-power impulse magnetron sputtering (HiPIMS) has been used in growth of Hf-N in an Ar–N2 atmosphere and Ti-O in an Ar-O2 atmosphere. The method is based on real-time monitoring and control of the discharge current waveforms. To stabilize the process conditions at a given set point, a feedback control system was implemented that automatically regulates the pulse frequency, and thereby the average sputtering power, to maintain a constant maximum discharge current. In this way stoichiometric HfN and TiO2 could be grown over a wide range of reactive gas flows, maintaining the process stably in the transition zone. The physical reasons for the change in the current pulse waveform for different process conditions are discussed.

Keywords
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