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Mo/Cu Multilayers by Bias HiPIMS for X-Band technology

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Feasibility of the production with ionized sputtering of Mo/Cu multilayers with nanometer periodicity inside compact X-band radio-frequency cavities is studied. High gradients require high electromagnetic fields and power flows, which pose serious issues with the materials. Pulsed stress at surface could be responsible of the surface breakup by cyclic fatigue. Nanometer periodicity metallic multilayers might be able to reduce or prevent the device RF-breakdown due, in the final analysis, to the surface material transformation induced by the high power pulsed-microwave electric and magnetic fields, which, in turn, promote destructive electrical discharge.

Deposition of multiple Mo/Cu nano-layers obtained by the ionized sputtering HiPIMS technique in a dual closed field magnetron system is presented. The key aspects of the process are presented and interpreted using time-resolved optical emission spectroscopy and electrical measurements. Electron microscopy and α -particles EBS are used to characterize the multiple nano-layers.

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