Abstract Submitted
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**Density of copper atoms in the ground and metastable states in an argon magnetron discharge correlated to the Cu deposition rate**[1] NADER SADEGHI, Univ. Grenoble & CNRS, France, HAMID NAGHSHARA, SIROUS KHORRAM, SAMAD SOBHANIAN, Faculty of Physics, Univ. Tabriz, Iran — Resonance absorption technique is used to measure the density of copper atoms in the ground state Cu ($^2S_{1/2}$) and metastable state Cu*($^2D_{5/2}$) in a DC magnetron plasma at different argon pressure ($p$=0.3 to14 $\mu$bar) and discharge power (W=10 to 200 W). The gas temperature is also deduced from the spectral profile of the $N_2(C^3\Pi_u - B^3\Pi_g)$ 0-0 emission band when trace of nitrogen is added to the feed gas. Our results show that with increasing $p$ and $W$, the density of Cu*($^2D_{5/2}$) metastable atoms can exceed that of the ground state copper atoms. It comes out that copper atoms sputtered from the target are mainly in the ground state but in the presence of the plasma, an important part of these atoms is transferred, by electron impact excitation, to the metastable states. The deposition rate on a quartz $\mu$-balance, located at 18 cm from the target, is perfectly correlated to the total density of copper atoms in both Cu ($^2S_{1/2}$) and Cu*($^2D_{5/2,3/2}$) states. These experimental results are supported by a Monte Carlo simulation of the Cu atoms transport from the target to the substrate.

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