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Copper oxide thin films by reactive magnetron sputter deposition: chemistry vs. mobility

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Two main driving forces influence the thin film microstructure and texture during reactive DC magnetron sputtering: the thin film composition and the mobility. The latter is mainly defined by the available energy per arriving atom, and can be modified by the deposition conditions. In this study, the impact of these driving forces is studied during the growth of copper oxide thin films. The thin film composition was modified by a change of the oxygen partial pressure, and the pumping speed. The deposition rate drops a function of the oxygen fraction due to a change of the target sputter yield. The latter was independently quantified based on gas consumption measurements. The discharge current affects both the thermal flux towards the growing films, and the deposition rate, and permits in this way to modify the energy per arriving atom. The film texture was characterized by X-ray diffraction. From our measurements it became clear that the oxygen fraction defines the crystallographic phase which is hardly influenced by the average energy per arriving particle.

Keywords
copper oxide
fraction of oxygen