

Molybdenumoxide ( $\text{MoO}_x$ ) thin films can change their optical properties upon exposure to hydrogen. Since the film properties strongly depend on process parameters we have studied how the films are affected by the total pressure during deposition. Stoichiometric and substoichiometric  $\text{MoO}_x$  films were prepared by reactive direct current magnetron sputtering in an atmosphere of argon and oxygen. Substoichiometric films were coated with platinum as a catalyst and were colored in diluted hydrogen atmosphere and bleached in air. Optical spectroscopy, X-ray reflectometry, spectroscopic ellipsometry and simulations of the measured spectra were used to characterize the films ex situ. In situ switching characteristics as revealed by optical spectroscopy and changes in stress were measured as well. We find that the total pressure during sputter deposition has a strong influence on the optical constants, the film density, and the sputter rate. The mechanical stresses and switching Preprint submitted to Elsevier Science 10 March 2006 cycles during the film coloration and bleaching also strongly depend on the total pressure. The influence of the sputter pressure on film properties is explained by the kinetics during the sputter process.