

**Abstract:** In the present work Mg films prepared by RF magnetron sputtering were studied. Variable energy positron annihilation spectroscopy (VEPAS) was employed for investigation of defects in the Mg films. VEPAS characterization was combined with scanning electron microscopy and X-ray diffraction in order to determine grain size, phase composition and texture. The effect of different deposition rate and deposition temperature, annealing, various substrates and film thickness on the structure and amount of defects present in the Mg films was examined. Defect studies by VEPAS showed that positrons in studied Mg films are trapped at misfit dislocations and at vacancy-like defects in grain boundaries and their density can be reduced by the deposition at elevated temperature.