ROBL-CRG	**Experiment title:** Stress Relaxation and Vacancy Creation in Ion Beam Sputtered Platinum Films	**Experiment number**: 20-02/729
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In this study we investigated the correlation between microstructure and residual strain relaxation in nanocrystalline Pt films with a thickness of about 20 nm produced by different deposition techniques: magnetron sputtering and ion beam sputtering. X-ray diffractometry was carried out using synchrotron radiation. The out-of-plane interplanar distance was measured during isothermal in situ annealing at temperatures between 130 °C und 210 °C. The thermoelastic expansion coefficient is equal for both types of nanocrystalline Pt films and slightly lower than for coarse grained Pt. The relaxation of residual out-of-plain strain depends on temperature and is significantly stronger in the case of the magnetron sputtered films than for the ion beam sputtered films. Different relaxation of compressive stress is ascribed to the different microstructures which evolve during deposition via the corresponding deposition technique. Thickness fringes around the (111) Bragg peak deposited via magnetron sputtering reveal that these films are essentially composed of columnar (111) oriented grains which cover the whole film thickness. In contrast, no thickness fringes are observed around the (111) Bragg peak of films prepared by ion beam sputtering indicating a significantly different microstructure. This is confirmed by Electron Backscatter Diffraction which reveals a (111) texture for both types of films. The (111) texture, however, is significantly stronger in the case of the magnetron sputtered films. Grain growth at low homologous temperatures is considered to be an important contribution to relaxation of residual stress.

W. Gruber, C. Baehtz, M. Horisberger, I. Ratschinski, H. Schmidt, *Microstructure and strain relaxation in thin nanocrystalline platinum films produced via different sputtering techniques,* Applied Surface Science 368 (2016) 341–347.