

MUELLER MATRIX ANOMALY NEAR THE CURIE TEMPERATURE OF NI

F. Abadizaman, S. Zollner

Department of Physics, New Mexico State University, Las Cruces, NM, USA

The temperature dependence of the optical constants of magnetized bulk Ni and Ni(111) films demonstrates an anomaly near the Curie temperature ($T_c=627$ K). We investigate this anomaly by taking measurements of the temperature dependent Mueller Matrix (MM). Using spectroscopic ellipsometry at an energy of 1.97 eV, the MM measurement was taken as a series of four runs, going up and down from 400 K to 800 K. The MM data of magnetized Ni reveal very small changes in the anisotropic portion of the MM compared to the windows effect while passing T_c . However, very large changes in the isotropic MM elements were found.

After the first series of measurements, the sample was magnetized again and went through the same series of four runs. However, the second series does not demonstrate any changes near T_c . The authors believe that the large change in the first series of measurements near T_c indicates a relation between magnetization and the morphology of the sample, yet the second series contradicts the statement.

Furthermore, powder XRD data of the sample before and after the measurements do not show any observable variation of the out of plane grain sizes.

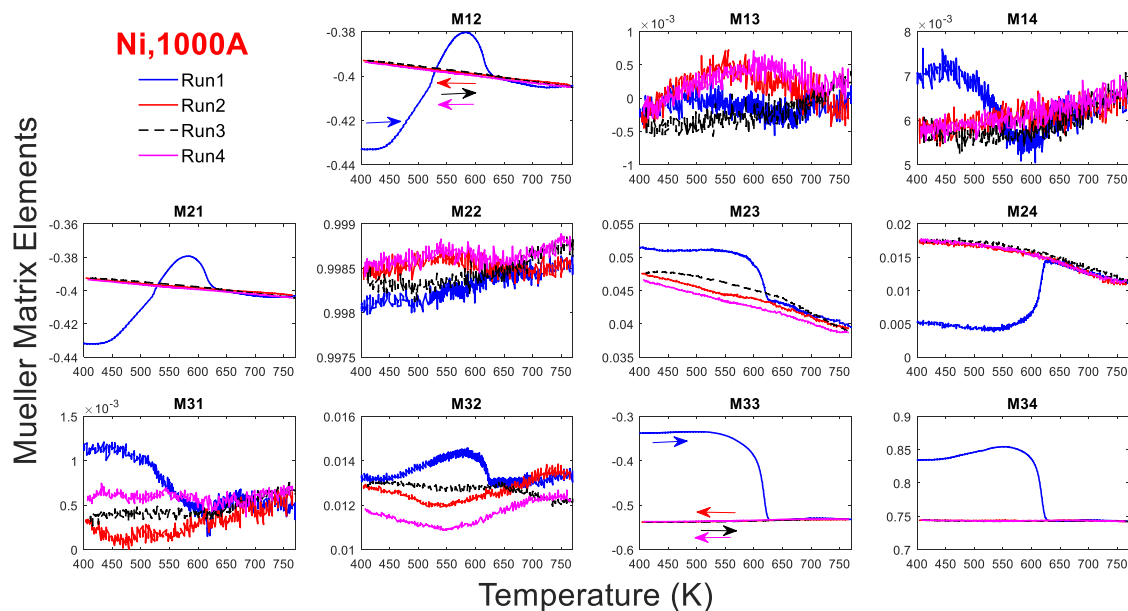


Fig. 1. Mueller Matrix measurements of a 1000 Å thick Ni film on thick SiO₂ at 1.97 eV as function of temperature.