



Quantitative analysis of pyrolytic carbon by polarized light microscopy

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The optical properties of differently textured pyrolytic carbon films were *quantitatively* analyzed by polarized light microscopy. The light intensity for the investigation of optically anisotropic and birefringent materials by polarized light microscopy was calculated as a function of the analyzer angle and the orientation of the material. From these calculations the dependence of the extinction angle on the optical properties of the material such as the reflection coefficients for ordinary and extraordinary rays and their relative phase shift was determined for flat as well as for cylindrical carbon layers [1]. These calculations are not only essential for an understanding of the characterization of pyrolytic carbon films by polarized light microscopy but also for an understanding of the correlation between extinction angles measured for flat and for cylindrical pyrolytic carbon layers.

Pyrolytic carbon films deposited on flat cordierite substrates were studied by polarized light microscopy. From the fit of the experimental data, reflection coefficients and their relative phase shifts could be quantitatively determined for differently textured pyrolytic carbon layers. Extinction angles as high as 21° were measured on flat substrates.

[1] E.G. Bortchagovsky, B. Reznik, D. Gerthsen, A. Pfrang, Th. Schimmel. *Optical properties of pyrolytic carbon deposits deduced from measurements of the extinction angle by polarized light microscopy*. Carbon **41** (2003), 2430-2433.