

Registration for the Spring-Meeting of the
German Physical Society
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in dresden

Texture Characterization of Pyrolytic Carbon Layers: A Quantitative Study by Polarized Light Microscopy and Selected Area Electron Diffraction — •ANDREAS PFRANG¹, DAVID BACH², DAGMAR GERTHSEN², and THOMAS SCHIMMEL^{1,3} — ¹Institute of Applied Physics, University of Karlsruhe, D-76128 Karlsruhe, Germany — ²Laboratory for Electron Microscopy, University of Karlsruhe, D-76128 Karlsruhe, Germany — ³Institute of Nanotechnology, Forschungszentrum Karlsruhe, D-76021 Karlsruhe, Germany

Many properties of pyrolytic carbon strongly depend on the degree of texture which is frequently analyzed by polarized light microscopy (PLM) and selected area electron diffraction (SAED). PLM allows the fast determination of the extinction angle A_e . SAED exhibits a higher spatial resolution and allows the determination of the orientation angle.

A quantitative model for the relationship between extinction angle determined by PLM and orientation angle determined by SAED is presented and applied to our experimental data. The distribution of the orientation of coherent domains is derived from SAED data and the reflection coefficients of pyrolytic carbon are calculated as the sum of the reflection coefficients of the coherent domains. The only fit parameters in our model are the ratio of the reflection coefficients of the coherent domains for extraordinary and ordinary rays, and the relative phase shift. Good agreement between calculation and experiment is achieved.

[1] A. Pfrang, D. Bach, D. Gerthsen, Th. Schimmel. Texture analysis of pyrolytic carbon by polarized light microscopy and selected area electron diffraction. Carbon 2005, Gyeongju, Korea (2005)

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Section: Thin Films
Subject: Film Characterisation: Structure Analyse (XRD, TEM, ...)
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