pCVD diamond beam position monitors for PETRA III

Eckhard Wörner

Diamond Materials GmbH Tullastraße 72, 79108 Freiburg, Germany





CARAT workshop 13-15.12.09 1/39

- Some news about "Diamond Materials"
- pCVD diamond beam position monitors for PETRA III



Fraunhofer IAF / Micronas



Low pressure deposition of diamond:

CVD: Chemical Vapor Deposition



CARAT workshop 13-15.12.09 4/39

Synthesis

Isolated crystallites (nucleation)

polycrystalline plate





CARAT workshop 13-15.12.09 5/39

Proprietary deposition technology: P6





CARAT workshop 13-15.12.09 6/39

Ultraflat diamond windows



Superpolished diamond substrates





Nanocrystalline diamond films and plates





CARAT workshop 13-15.12.09 9/39

Polycrystalline diamond membranes





CARAT workshop 13-15.12.09 10/39

Polycrystalline diamond membranes

Unpolished > 50nm Ø: 1mm

Polished > 2µm / Ø: 10mm





CARAT workshop 13-15.12.09 11/39

- Some news about "Diamond Materials"
- pCVD diamond beam position monitors for PETRA III



PETRA III at DESY Hamburg









CARAT workshop 13-15.12.09 13/39

Fluorescence screens



CARAT workshop 13-15.12.09 14/39

Fluorescence screens



Diamond Light Source



Advanced Diamond Technology

CARAT workshop 13-15.12.09 15/39

pCVD diamond beam position monitors for PETRA III



fluorescence detectors



Diamond Materials Advanced Diamond Technology

CVD diamond fluorescence screens (measured at ESRF / ID6)







CARAT workshop 13-15.12.09 18/39





CARAT workshop 13-15.12.09 19/39





CARAT workshop 13-15.12.09 20/39





CARAT workshop 13-15.12.09 21/39





CARAT workshop 13-15.12.09 22/39





CARAT workshop 13-15.12.09 23/39





CARAT workshop 13-15.12.09 24/39

Spectral fluorescence yield (measured at ESRF/ID6)



Quadrant detectors for X-ray synchrotron PETRA III



Diamond Light Source

DESY-

Advanced Diamond Technology

Diamond

Materials

CARAT workshop 13-15.12.09 26/39



pCVD diamond quadrant detectors for PETRA III



"solid state ionization chamber"

quadrant detectors for beam monitoring



Advanced Diamond Technology

Diamond Materials

CARAT workshop 13-15.12.09 27/39



pCVD diamond quadrant detectors for PETRA III

- high quality pCVD diamond
- membrane supported by silicon ring
- open diameter: 10mm
- structured metallization (20µm gap)
- membrane thickness < 10µm

quadrant detectors for beam monitoring



Advanced Diamond Technology

Diamond Materials

CARAT workshop 13-15.12.09 28/39



X-ray absorption in diamond

Measurements at DIAMOND 124 Microfocus beamline



Measurements at DIAMOND 124 Microfocus beamline



Measurements at DIAMOND I24 Microfocus beamline





pCVD diamond beam position monitors for PETRA III





CARAT workshop 13-15.12.09 33/39



pCVD diamond quadrant detectors for PETRA III

single crystals? "not yet"



CARAT workshop 13-15.12.09 34/39

