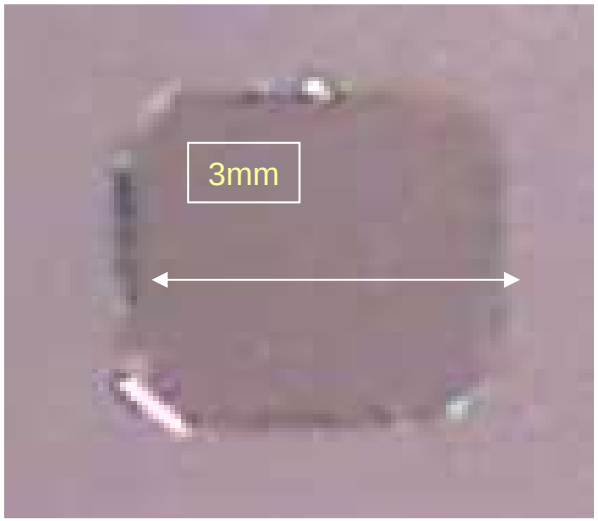
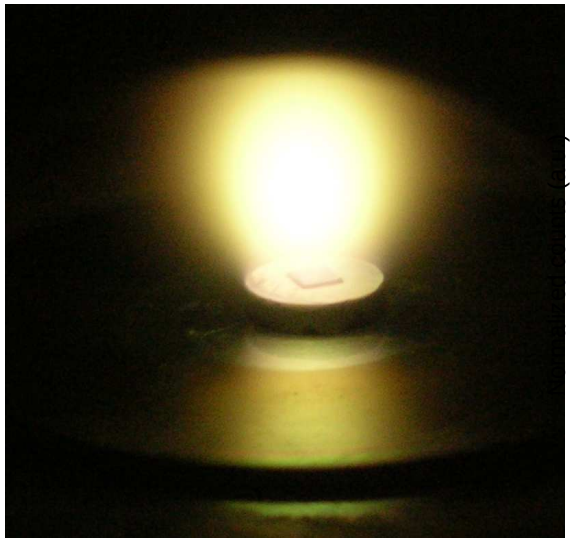
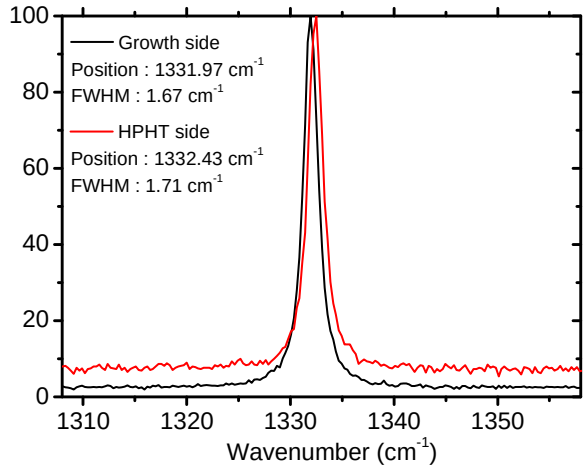
High electronic performance PECVD Single crystal

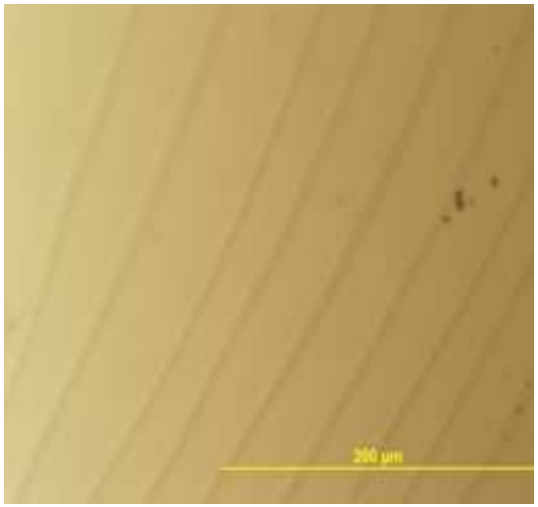
CEA - Saclay







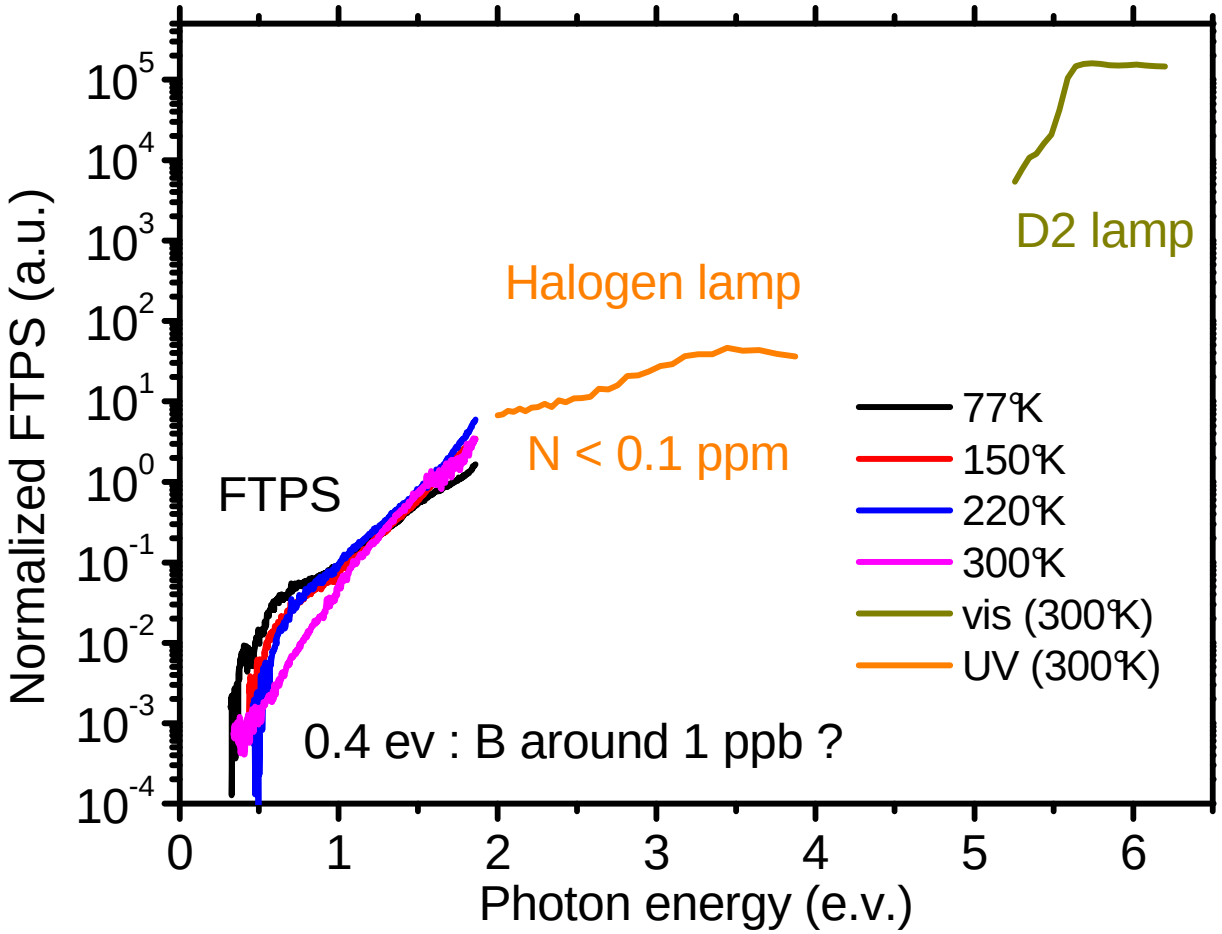
Dense MW plasmas



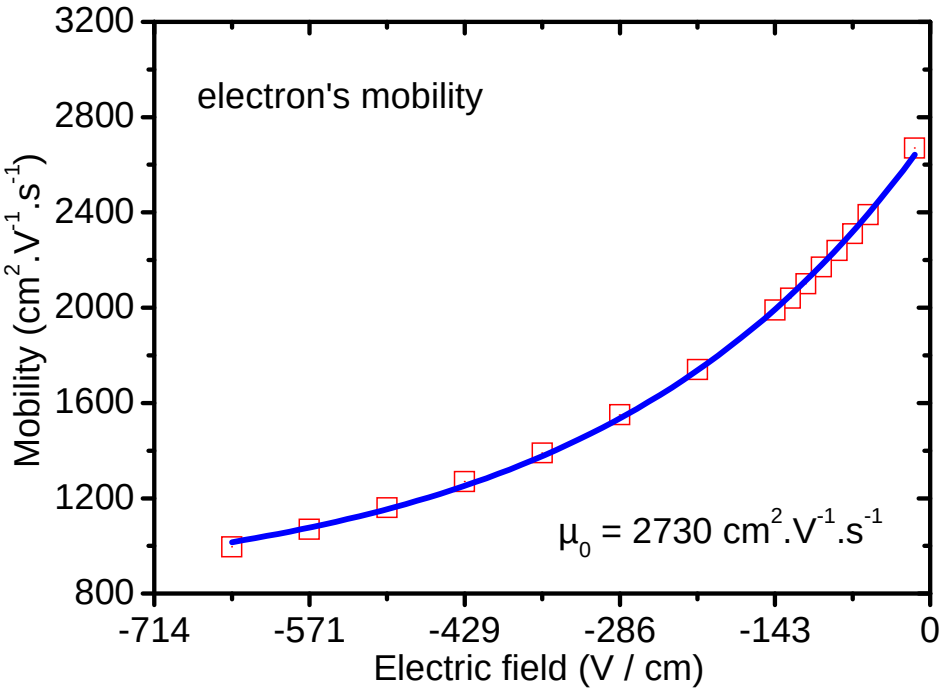
Surface varying form step flow to atomically Flat surfaces

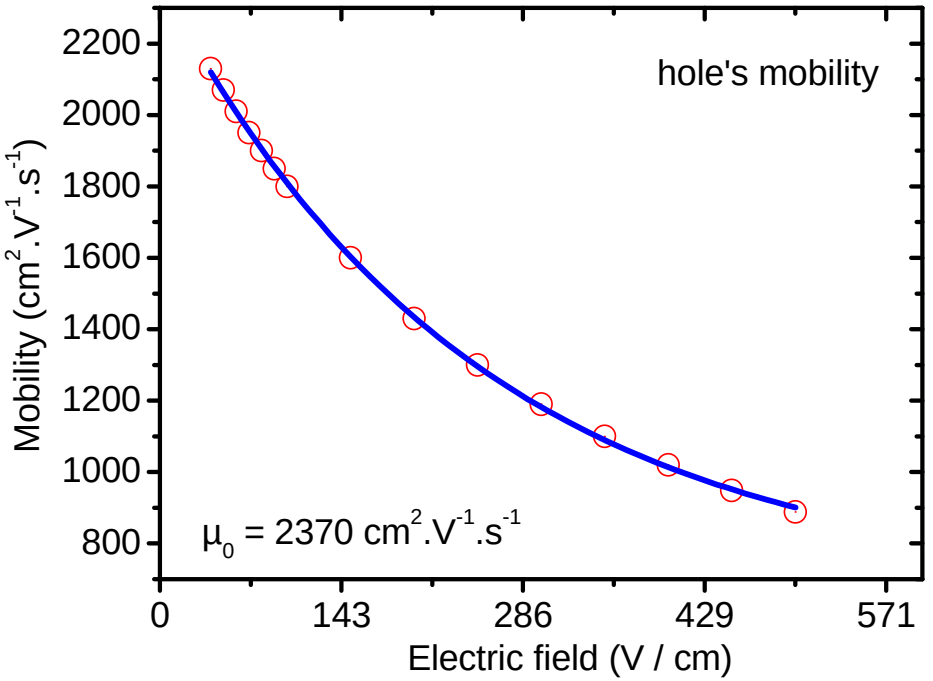
Optical absorption spectroscopy (AM-FTPS)

AM- FTPS



TOF using Laser excitation





Higher mobility for electrons than holes

Proposed works in the projects:

- **Optimisation of HPHT surfaces before the growth**
  Optimisation of Surface SC CVD surface treatments
  (Ion implantation plasma) – smoothening

- **Study of contacts on variously treated smooth surfaces**
  (Schottky diodes, Litography)

- **Defect spectroscopy and trapping/recombination kinetics**
  (TOF(T), UV, alpha)

- **Further optimisation of growth (high growth rates, plasma configuration)**

- **Doping (B, P) towards devices**
  – study of radiation hardness of doped diamond

Institute of Physics Academy of Sciences of the Czech Republic, Prague

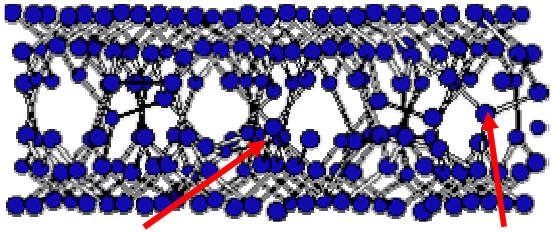
- Dr. Milan Vanecek &..

- Growth of NCD diamond (Aixtron, Linear Antenna)
- Preparation of electronic grade NCD material
- Optical spectrsocopy, $\mu\tau(\lambda)$ spectroscopy, AFM, STM, FTPD

Nanocrystalline diamond

N- UNCD (Argon/CH_4 plasma)

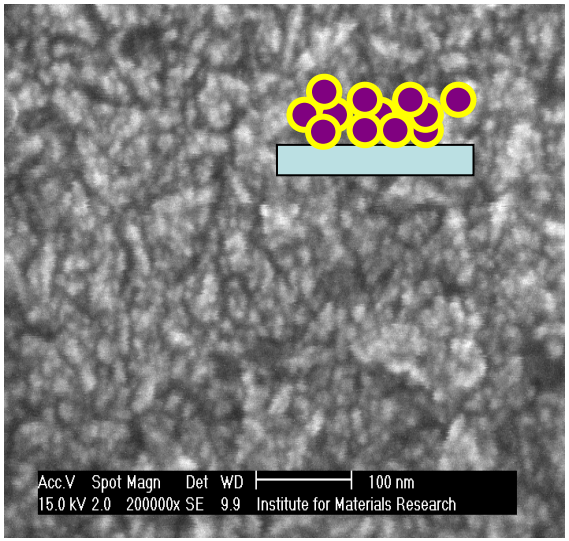
Local metallic conduction



sp^3 sp^2

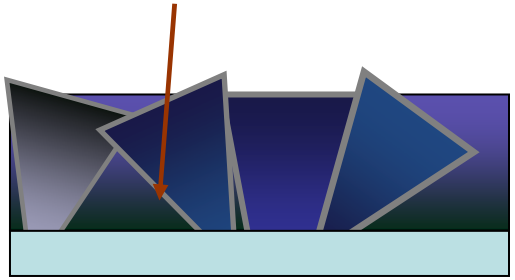
P. Zapol Phys. Rev. B 65 (2001) 045403

5 – 15 nm grain size
remains nano-grained
renucleation



B-NCD (H_2/CH_4 plasma)

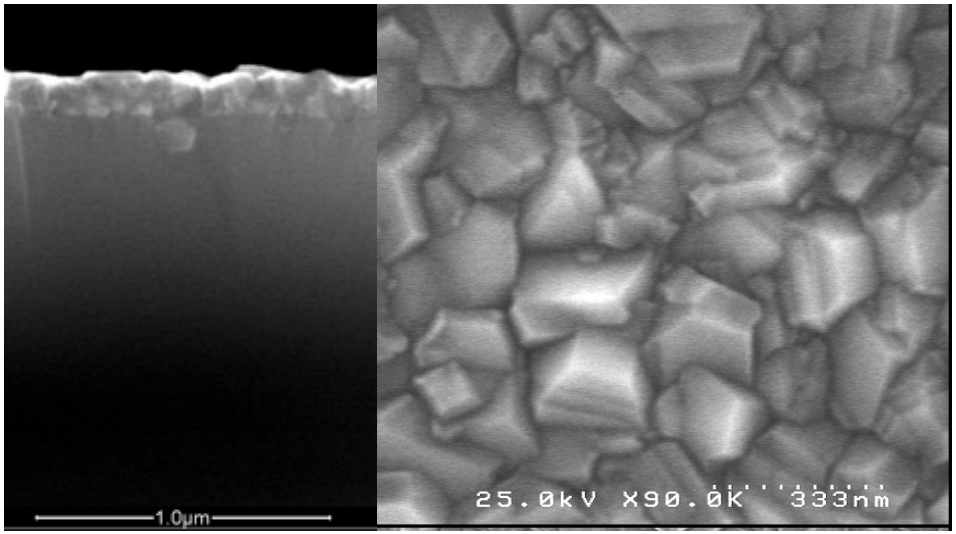
In-grain (MIT) metallic conduction



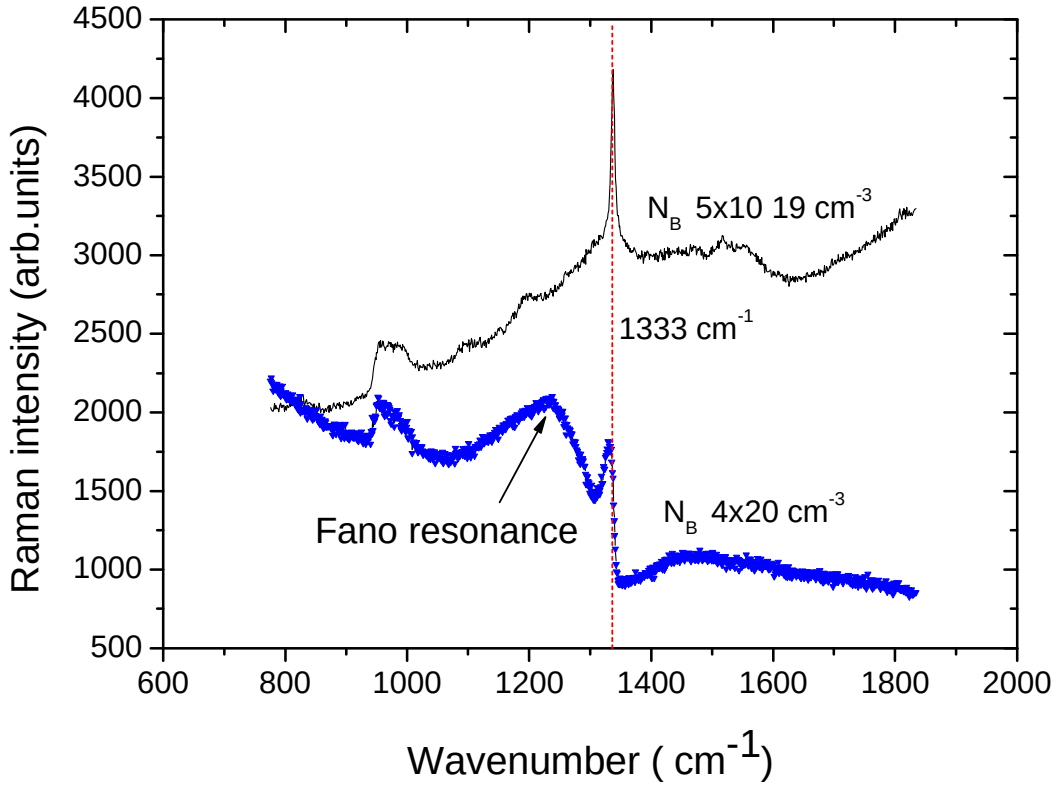
20 – 100 nm grain size

Films 20- 400 nm thick

Van der Drift, columnar



Raman spectra NCD films (undoped, B-doped)



Raman spectra of variously boron-doped nanocrystalline diamond film s with B:C gas doping ratio

800 and 3000 ppm., Central zone phonon at 1332 cm^{-1} is marked by a dash line.
The Fano resonance ~ a broad peak at about 1230 cm^{-1}
and deformation of the zone-centre phonon line.

Photocurrent in NCD