



CEITEC
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OF TECHNOLOGY

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Synthetic diamond thin films: a brilliant in science

MARCH, 13

Tuesday, 10:00

Seminar room S2.02
CEITEC BUT, Purkynova 123

In recent years, many reports in the literature have pointed out the advantages of smart and (bio) functional coatings for interdisciplinary fields in material engineering, optics, chemistry and physics, life science, regenerative medicine, etc. Among the broad family of novel carbon materials (i.e. graphene, carbon nanotubes, diamond nanoparticles, etc.), the diamond thin films attract scientific and industrial community due to their unique properties tunable for wide range of applications

The present work encompasses the progress in chemical vapor deposition (CVD) of diamond thin films on various "non-diamond" substrates (Si, GaN, metals, glass, Ge, carbon foam, etc.). Nucleation process, i.e. surface activation of these substrates will be pointed out as a crucial technological step in the diamond CVD. Ion bombardment and ultrasonic seeding with diamond nanoparticles without/with polymer composite will be briefly shown as an effective way to achieve seeding densities as high as 10^{13} cm^{-2} . Microwave plasma-assisted CVD systems with focused and linear antenna arrangement will be compared & discussed in the sense of growth rate, deposition temperature, and substrate geometry.

It will be shown that diamond films consisting of nano-sized crystals (30-100 nm) exhibit good enough electronic properties for the realization of electronic devices and optical elements. Finally, potential applications of diamond-based chemical detectors, (bio-) electronic sensors, optical elements and artificial substrates in tissue engineering will be discussed.