Technische Universität Braunschweig

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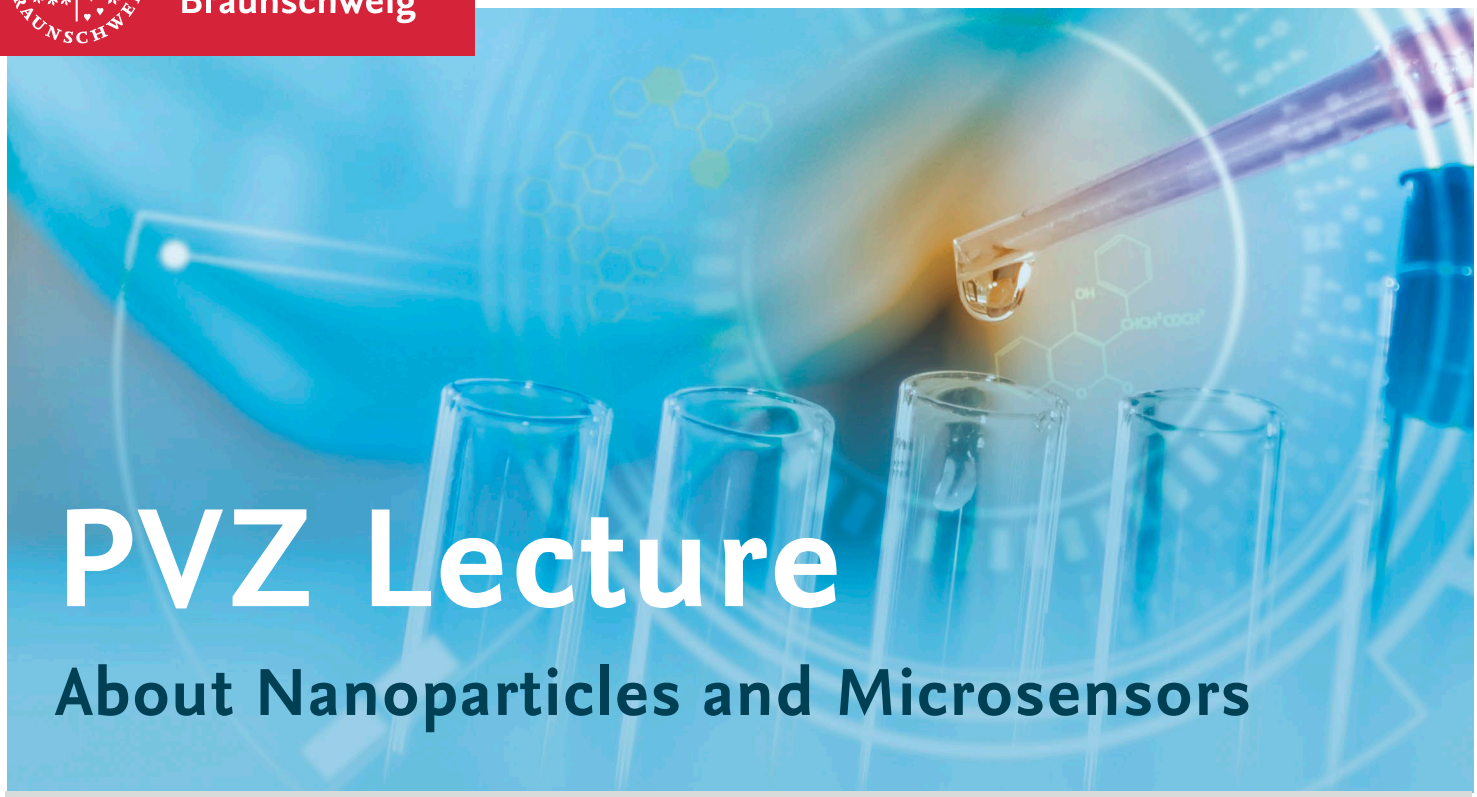

PVZ Lecture

About Nanoparticles and Microsensors

Immobilization and Micro-analytics of modern Layer-by-Layer based delivery systems for antibodies or RNA/DNA

Dr. Lars Dähne, Surflay Nanotec GmbH, Berlin

2022
12. Juli
16:00-17:00 Uhr

Anyone interested is welcome!
Free of charge, participation without registration.

VENUE
Center of Pharmaceutical Engineering
Franz-Liszt-Str. 35a • 38106 Braunschweig
Room 049/050

ORGANISATION & CONTACT
TU Braunschweig • Center of Pharmaceutical Engineering
Phone +49 531 391-65502 • pvz@tu-braunschweig.de
www.tu-braunschweig.de/pvz

ABSTRACT

Immobilization and Micro-analytics of modern Layer-by-Layer based delivery systems for antibodies or RNA/DNA

Lars Dähne, Mateusz Olszyna, Gabriella Egri, Aline Debrassi
Surflay Nanotec GmbH, Max-Planck-Str. 3, 12489 Berlin

The Layer-by-Layer (LbL) technology is based on the alternating deposition of nanometer thin layers of cationic and anionic macromolecules. It enables on the one hand the immobilization of macromolecular drugs either directly in the film structure or also in so called LbL-capsules. Due to the properties of LbL films (switchable semi-permability) such drugs can be released in a controlled way by changing e.g. pH or ion concentration. The LbL technology will be explained and some examples given for drug encapsulation and release.

The investigation of such advanced and miniaturized systems are mainly performed in microfluidic cell experiments. In order to control the parameters for cell growth in microfluidic devices, we have developed several micro- and nanosensors which measure e.g. temperature, pH, oxygen or chloride concentration.

Furthermore, a quite new technology based on “Low Q-Whispering Gallery Modes (WGM)” was developed, which can detect online tiny amounts of specific proteins or other macromolecules. As sensors serve 10 µm small beads of high refractive index which can easily be immobilized in microfluidics or cell arrays. In the beads light waves are captured and circulate approx. 10 000 times by total reflection on the inner surface, thereby sensitively scanning the surface. When molecules are adsorbed on the surface of the particles, the refractive index and diameter changes, leading to shifts of their resonance frequency. The shift is readout by a high-resolution spectrometer and quantify the number of attached molecules. For the specific detection of biomolecules, the WGM sensors are functionalized with antibodies or oligonucleotides. We will present the Low Q WGM technology and indicates its advantages by some application examples.