

## SYMPOSIA

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phellandrene. These results helped identify prerequisites for the efficient heterologous production of terpene hydrocarbons by the photosynthetic apparatus, comprising: (i) requirement for over-expression of the heterologous terpene synthases, so as to compensate for the slow catalytic turnover of these enzymes, and (ii) enhanced endogenous carbon flux toward the terpenoid biosynthetic pathway upon heterologous expression of the MVA pathway, thereby supplementing the native MEP pathway in terms of carbon-flux toward the universal isopentenyl-diphosphate and dimethylallyl-diphosphate terpenoid precursors. The above prerequisites are critical determinants of yield in the photosynthetic CO<sub>2</sub> conversion to terpene hydrocarbons.

### ShT.06-1

#### Newly introduced sensing concept in forensic and biometric applications

J. Halamek

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The analysis of biomarkers has been used in the field of forensics significant time mainly focused on DNA (usually from blood) for identification purposes. The process of matching DNA samples, however, is very time consuming and have caused serious backlogs worldwide. While this is a useful tool, it may not be the best method of analysis during an active criminal investigation. Although the forensic science field has developed rapidly over the years, the investigation processes are lengthy and majority of the routinely used forensic science techniques require proper sample collection at the crime scene followed by transportation to a laboratory facility before performing any informative analyses. The research concept, originated in our lab and presented here addresses this situation by introducing the use of bioaffinity-based tools for quick, straightforward and non-invasive analyses of sweat capable of serving as an alternative to the time-expensive DNA identification processes via the bioaffinity detection of small molecules in sweat. Furthermore, the bioaffinity concept is remarkably versatile and can be adjusted for the analysis of a wide range of substrates for the discernment of different physical traits. This research can impact field of the forensic and biometric science community by providing new methods for the non-invasive analysis/monitoring of skin surface. Ultimately, these systems are being incorporated into field-deployable devices and connected to handheld smart-devices which will allow for rapid analysis of body fluids that can be used and interpreted by operators with no scientific training, and thus revolutionizing the “front end” of forensic and biometric science.

### ShT.06-2

#### Two-component regulation systems of dominated electrogenic bacteria in microbial fuel cells treating swine wastewater

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Two pairs of laboratory-scale microbial fuel cells (MFCs), one set inoculated with a beer wastewater-treating anaerobic digester

sludge and the other with swine wastewater sludge, were used for comprehensive analysis of electricity generation and waste treatment. Metagenomic analysis was conducted to determine potential metabolic capabilities and strategies for adaptation on the anodes of both MFCs by the dominant bacterial species. Two-component regulation systems enable bacteria to adapt to MFC environments. We found different bacterial chemotaxis-like chemosensory systems involved in a biofilm formation by dominant bacterial species on the anodes of MFCs: Flagellar assembly associated with the chemotaxis (Che) response regulators (*cheBVY*) (*Geobacter*, *Shewanella*, *Pelobacter*, etc.); the Chp chemosensory system responsible for the twitching motility and biofilm formation (*Geobacter*, *Pseudomonas*, *Acinetobacter*, *Xantomonas*); the diffusible signaling factors (DSF) (CpI and G54-dependent genes) involved in biofilm formation, motility and virulence (*Geobacter*, *Pelobacter*, *Flavobacterium*, etc.); the anti- $\sigma$ 54-dependent -  $\sigma$ 54-dependent genes regulating swarming activity and biofilm formation (*Geobacter*, *Shewanella*, *Pelobacter*, *Pseudomonas*, *Syntrophus* etc.); and flagellar assembly genes associated with quorum sensing (*flhCD*, *fliAC*, *motA*) (*Geobacter*, *Shewanella*, *Pelobacter*, etc.). Some bacteria, such as *Clostridium*, *Azotobacter*, *Pseudomonas*, *Arcobacter* and *Xantomonas*, show apart adaptation to survival in MFCs by upregulating the *dlt* complex (CAMP repulsion), which should lead to a decrease in the negative charge of the bacterial surface. Additionally, the *agr* quorum-sensing system participating in biofilm formation was found only in *Clostridium*. Thus, bacteria found on the anode surface of MFCs have the same components of regulatory systems involved in biofilm formation.

### Tuesday 10 July

9:00–11:00, Panorama Hall

#### Proteases in cancer pathogenesis and immunity

##### S.31-1

#### Proteases as mediators of invasiveness and chemoresistance in glioblastoma

J. W. Bartsch

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Whilst Proteases are well-established modulators of tumor cell invasion mainly by degradation of the extracellular matrix, their role in chemoresistance is somewhat surprising. In my talk I will present recent data on the role of MMPs and ADAM proteases in acquiring chemoresistance in glioblastoma cells. To analyse the role of proteases, we are isolating glioblastoma stem cells and.

##### S.31-3

#### TIMPless systems inform tissue and stem cell homeostasis

R. Khokha

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The four endogenous tissue inhibitors of metalloproteinases (TIMPs) regulate the pericellular proteolysis of a vast range of matrix and cell surface proteins, generating simultaneous effects on tissue architecture and cell signalling. We have recently summarized the hierarchy of the relationships between TIMPs, metalloproteinases, their plethora of substrates, as well as cellular