Toegekende projecten Chemical Sensing & Enabling Technologies

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Lopende projecten

Microfluidic-Microcoil NMR Hyphenation for Molecular Identification and Quantification CHEMIE.PJT.2017.006
Wageningen University / Leiden University / DSM Food Specialties BV / Unilever /Bruker Biospin GMBH / Spinterest BV

Identification and quantification of unknown compounds now requires time-consuming separations and access to expensive NMR measurement equipment. By miniaturizing both separation methods and NMR measuring coils, unknown compounds can be identified more quickly. Miniaturization of NMR measuring coils has the important advantage that a considerable gain in mass sensitivity can be achieved with low costs.

Nanotechnology for early cancer diagnostics CHEMIE.PGT.2017.001
Twente University

Our aim is to develop a microfluidic sensor for the femtomolar detection of hypermethylated DNA (hmDNA) for population-based cancer screening and early cancer diagnosis. HmDNA is a biomarker for cancer and precancerous lesions in need of treatment and, depending on the genes that are methylated, it can be related to a specific type of cancer. We have previously shown that specific hmDNA sequences can be used as triage markers in cervical cancer screening when applied to HPV-positive cervical smears and self-collected cervico vaginal specimens (self-samples). Similarly, the analysis of hmDNA has proven promising for the detection of (recurrent) bladder cancer. The technical challenge is the detection of the cancer specific DNA, which is in the femtomolar range. Using nanotechnology, smart detectors will be developed that are eventually integrated with concentration enrichment steps and optimal chemistry, such that the detection limit is achieved. In this project we will look at new microfluidic sensors that can detect the low concentrations of hmDNA.

COAST Talent Fund (TAFU) incubator CHEMIE.PGT.2020.003
TI COAST

The COAST Talent Fund (TAFU) is set up as a framework for incubator projects, conducted by COAST students from the ASTP and MSc+ Talent Programs, which are supported by industry and by ChemistryNL. All projects within the framework receive in-kind (or cash) contributions from private parties equal to the sum received from the TKI fund. The TAFU project is organized by COAST and conducted by participating private partners and knowledge institutes.

Chemosense: data-driven approaches for food products with superior sensorial properties CHEMIE.PJT.2017.001
Wageningen University / Unilever R&D / DSM

Taste and smell, two of the most important aspects of nutrition, are based on the interplay of many chemical components. Understanding the relationship between chemistry, taste and smell – for both good and bad qualities such as odor of spoilage - will lead to new food products with more intensive taste experiences. The target is to obtain the full flavor profile with cleverly chosen measured chemical components predict nutricion.

Smart analysis of Complex Organic mixtures in Pre-biotic Environments (SCOPE) CHEMIE.PGT.2021.019
Amsterdam University / Spacetek Technology AG

he origin of life is to this day a great enigma. Insights in Early-Earth conditions and synthesis of building blocks of life in the laboratory have become more advanced than ever. However, it is entirely unclear how these two frameworks can be combined to any form of life. The laboratory and realistic scenarios are still milestones apart. One of the main hurdles to tackle is the difficulty of unravelling the complex chemistry of organic mixtures from which life could emerge. With the rise of artificial intelligence techniques, a unique possibility has appeared to tackle this complexity. We aim to investigate the otherwise impenetrable organic mixtures on emerging behavior relevant to life by combining sophisticated analytical apparatus with machine learning. With that, we aim to map the scope of conditions that may be essential for the origin of life. With this, we will develop a smart technique applicable for the analyses in other application areas.

Perfect Sorting JIP CHEMIE.PJT.2021.03
Nationaal Testcentrum Circulaire Plastics (NTCP)

Out of 14,8 million tons of plastic packaging waste in the EU, an optimistic estimate is that 40% are recycled. In order to increase this rate, sortability & recyclability of packaging is key. Currently sorting is based on material type only and not on the basis of original use of the packaging material nor future use of the recycled material. There is a need for a paradigm shift to increase recycling rates: a new way of sorting looking beyond material properties alone so as to move to material origin and recycling purpose criteria. The goal of the Perfect Sorting project is to develop and test a technology that is able to detect and classify packaging beyond the current material-based sorting streams: criteria based on individual packaging identification or based on predefined group identification (e.g. food applications). This is to enable a fit-for-purpose sorting in the future. This can be realized through the implementation of Artificial Intelligence based decision-systems using a large range of existing and new sensing technologies such as NIR hyperspectral camera, Raman spectroscopy and computer vision. The project is a collaboration between 9 FMCG brand owners, one waste management company, two universities, a knowledge institute, and in a later stage an AI technology implementation party.

Advanced Molecular Modeling for Improved Chromatographic Separations – AMMICS CHEMIE.PGT.2020.023
Delft University / GSK Biologics SA

Society demands cheaper medicines, however, biopharmaceutical proteins have to be effective and very pure and are therefore expensive. Chromatography is the pharmaceutical industry's workhorse to purify drugs, but is a very expensive purification technique. This project aims to use advanced mathematical models and computer simulations to improve the understanding thereby improving and accelerating the design of this purification step, bringing cheaper medicines closer bring.

Real-time Sensing CHEMIE.PGT.2020.024
Eindhoven University / Avebe / FrieslandCampina / Metrohm / Helia Biomonitoring

We will investigate and develop a new real-time sensing technology for on-line monitoring and control of critical molecular parameters in food processing. The sensor is based on measuring particle mobility with single-molecule resolution. The project focuses on demonstrating proof of concept for the monitoring of small molecules and proteins in food streams.

Afgesloten projecten

Scalable synthesis of high-efficiency organic dyes for colourful Building integrated photovoltaics
CHEMIE.PGT.2017.014
UvA / HIMS / Brite Solar Technologies BV

Solar panels with color.
We all know the black solar panels on the roofs of the neighbors, and these are usually based on inorganic semiconductor materials. But we can also make solar panels based on on molecular light traps, and these can in principle be all colors of the rainbow. The market for these types of solar cells is complementary, for example they are suitable for in-house applications, or as colorful objects in an entrance. In this project we develop new efficient, scalable synthesis pathways for dye molecules that form the basis of these types of solar cells, and we are also testing them on efficiency in real devices.

Outfitting the Factory of the Future with ON-line analysis (OFF/ON) CHEMIE.PJT.2015.008
Radboud University / Eindhoven University / AkzoNobel / DSM Resolve / Rijkswaterstaat / RIKILT - Wageningen UR / RIWA-Rijn

Industrial chemical processes are becoming increasingly complex, for example due to variable, natural raw materials. That is why all process measurements must be translated into interpretable information with which quality can be guaranteed. OFF/ON wants to use data processing methods from the 'omics' for this. This allows us to observe and improve the health of a process, just like that of a person.

High-end Analytical Detection coupled to a Gut-on-a-Chip (Guttest) CHEMIE.PJT.2015.009
Wageningen University / Groningen University / Galapagos B.V. / Friesland Campina Nederland B.V. / EuroProxima B.V./ Micronit Microfluidics B.V. / RIKILT- WUR

In this project, a buccal digestion and uptake model on a chip will be developed coupled with sensitive detection techniques. This makes it possible to determine very accurately whether certain chemicals and new drug candidates can be absorbed by the man. Possible harmful effects on the gut can also be detected early. It integrated gut-on-a-chip and detection system will be able to make a significant contribution to the reducing the use of animal testing.
