Funded by the Horizon 2020
Framework Programme
of the European Union

Deliverable N° D 4.8

Final Press Release

Project Identifier	636930
Project Acronym	iCspec
Project Title	in-line Cascade laser spectrometer for process control
Instrument	RIA
Thematic Priority	Integrated Process Control
Start date of Project	04/01/2015
Duration	3½ years

Due Date of Deliverable	30/Sept/2018 (extended project)
Actual Submission Date	30/Sept/2018
Lead Partner	Siemens
Other Partners	all

Short description:

The press release reports the finalisation of the iCspec project, summarizes the main goals and the results of the project. It will be published on the iCspec web site (http://icspec.eu/news.php) and on the Siemens Pictures of the Future (POF) online magazine during October 2018 (see https://www.siemens.com/innovation/en/home/pictures-of-the-future/industry-and-automation/pioneering-measurement-technology-for-process-industry.html)
The POF website reaches the expert audience as well as the interested public. It is an excellent dissemination channel with 50000 to 60000 website accesses per month.

Pioneering measurement technology for the process industry

In the future, the petrochemical industry will be able to measure and control the composition of gas streams in real time thanks to a new measurement technology. It will allow production plants to be controlled more closely, to set their product quality more accurately, and to increase their output. At the same time costs and the environmental impact of waste materials disposed will be reduced. To make this become reality, an international consortium cooperated to develop a laser spectrometer that analyzes gas mixtures. The project called iCspec (in-line Cascade laser spectrometer for process control, http://icspec.eu/) was a three-and-a-half year project sponsored under the EU Horizon 2020 program terminating in September 2018. Siemens coordinated the consortium consisting of eight European partners. As a project result a new Mid-Infrared laser-based demonstrator has been tested lately at Preem, Sweden's largest fuel company measuring the seven hydrocarbons methane, ethane, propane, n-butane, iso-butane, n-pentane and iso-pentane.

Analysis of complex gas compositions is usually done by process gas chromatographs, which requires up to several minutes depending on the gas matrix. Conversely, a laser spectrometer enables measurements to be taken directly in the gas flow or in a bypass line in real time. With less than 3 seconds response time the iCspec demonstrator impressively confirms the real time capability of laser-based multi-gas analysis. The laser technology also incurs lower operating expenses than existing technology.

Laser spectrometry exploits the fact that every light molecule absorbs particularly specific wavelengths. Although laser spectrometers that register individual molecules already exist, no solution was yet available that is capable of recording many industry-relevant gases simultaneously using a single laser module as light source.

A single spectrometer to measure many industrial gases

Achieving this needs a laser source that ideally covers the required infrared fingerprint range. The new spectrometer uses semiconductor laser arrays that can be controlled to enable examination of both absorption lines with single sharp molecular absorption lines and broad absorption features. Development of the laser source was in the hands of the Commissariat à l'énergie atomique et aux énergies alternatives (CEA), mirSense, based in France, the Politechnika Wrocławska in Poland, the University of Wurzburg and nanoplus Nanosystems and Technologies GmbH in Germany. Corporate Technology, Siemens' global research unit and Poland's Airoptic were working on the development of the spectrometer technology and established procedures to evaluate the measurement data. Evaluation poses its own particular challenges, since the measurements provide absorption spectra from many different molecules that sometimes overlap and must be accurately separated out. Spectral models based on physical parameters as well as neural networks have been applied successfully for accurate data analysis.

Applications also possible for emission monitoring or medicine

The demonstrator measures the composition of the gaseous hydrocarbons during distillation of crude oil at the refinery. But this is not the only application for this new technology: It will also be suitable for emission monitoring or patient exhaled gases to be measured using only one instead of a range of measurement devices. Likewise, when it comes to analyzing fluids, solid matter or biological tissue laser sources are far superior to the incandescent emitters currently used in spectrometers. Their higher intensity means that lasers penetrate much deeper into the materials being measured and generate more precise information in short time thus enabling new inspection equipment outperforming today's state of the art instrumentation.