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Press Release

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Project Acronym	iCspec..
Project Title	in-line Cascade laser spectrometer for process control
Instrument	RIA
Topic	SPIRE 1 – 2014: Integrated Process Controll
Start date of Project	04/01/2015
Duration	3 years

Due Date of Deliverable	04/30/2015
Actual Submission Date	07/16/2015
Lead Partner	Siemens
Other Partners	all

Short description:

The press release below announces the launch of the iCspec project and summarizes the main goals of the project. It is published on the iCspec web site and will be released in the Siemens Pictures newsletter (http://www.siemens.com/innovation/en/home/pictures-of-the-future.html) within July or August 2015. This newsletter reaches 23000 subscribers among these many multipliers like newspapers and journals.

Pioneering measurement technology for the process industry

In the future, the petrochemical industry will be able to measure and control the composition of material flows in real time thanks to a new procedure. 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 cooperates to develop a laser spectrometer that analyzes gas mixtures. Their initial objective is to build a demonstrator capable of analyzing hydrocarbon gas mixtures, which will then be tested at Preem, Sweden's largest refinery. The project is called iCspec (http://icspec.eu/). It is a three-year project sponsored under the EU Horizon 2020 program. Siemens coordinates the consortium consisting of eight European partners.

Analysis of material flows in production processes has previously been a time-consuming activity involving taking samples and measuring them in the laboratory. Online measurements usually use a gas chromatograph, with results taking several minutes. Conversely, a laser spectrometer enables measurements to be taken directly in the gas flow or in a bypass line in real time. This method also incurs lower operating expenses than a gas chromatograph, which requires regular calibration. Laser spectrometry exploits the fact that every light molecule absorbs particularly specific wavelengths. Although laser spectrometers that register individual molecules already exist, no solution is yet available that is capable of recording many industrial gases simultaneously.

A single spectrometer to measure many industrial gases

Achieving this will need a laser source that will ideally cover the required infrared fingerprint range. The new spectrometer uses a few modules with semiconductor laser arrays that can be controlled to enable examination of both absorption lines with single sharp molecular absorption lines and broad absorption bands. Because the wavelengths are set electronically and not mechanically, as has previously been the practice, the new method is much more robust and thus also suitable for rough operating conditions. Development of the laser source is in the hands of the Commissariat à l'énergie atomique et aux énergies alternatives (CEA) and mirSense a spin-off of III-V Lab and CEA-LETI, based in France; the Politechnika Wrocławska in Poland; and the University of Wurzburg and nanoplus Nanosystems and Technologies GmbH in Germany. Corporate Technology, Siemens' global research unit, is working with Poland's Airoptic to develop the spectrometer and establish 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.

Applications also possible in power plants or medicine

The planned demonstrator will have to measure the five hydrocarbons methane, ethane, propane, butane and pentane during distillation of gas components at a refinery. But this is not the only application for this new technology: It will also enable emissions from power stations 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 thus generate more information. In the longer term, this new technology could revolutionize measurement technology not just in the process industry but also in medical diagnostics.