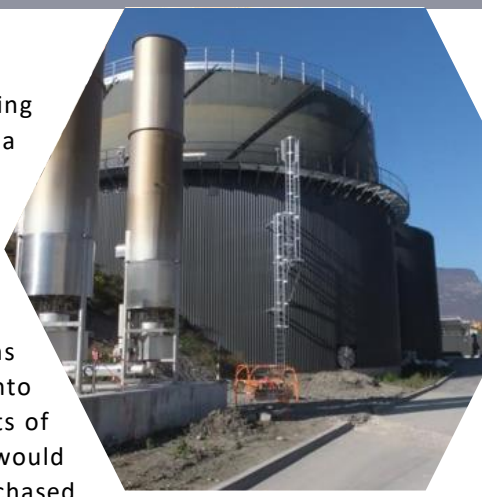


Challenge & Solutions

Nano-sensors can potentially bring huge advances to industrial analysis and monitoring applications, but only when integrated into economical full systems. Apix Analytics, a French startup, has pioneered miniaturized multi-gas gas chromatograph (GC) analyzers, and foresees strong demand across many sectors, but its success in high-volume markets depends on reducing costs of next-generation instruments. The company's current analyzers are based on proprietary nano-electro-mechanical systems (NEMS) devices. But about one-third of system materials costs are for supporting electronics, which handle AD/DA conversion, digital signal processing and other essential functions using numerous components. One potential solution is integration of these functions onto a single application-specific integrated circuit (ASIC), but Apix needed to know the costs of up-front engineering and fabrication, which in turn were dependent on which functions would be integrated, which chip technologies would be used, and how many units would be purchased.

The GOSPEL (GC Optimized for NEMS Sensors Electronics Platform) program focused on this complex process of definition, analysis and optimization. It generated a strategy of continuing to use commercial electronics for high-power, high-voltage functions, while integrating low-power analog functions (like conversion) and all digital processing into a dedicated ASIC. This made the design process simpler and more economical, while also allowing use of relatively inexpensive ST 65-nanometer fabrication technology. Result: a clear roadmap describing non-recurring engineering (NRE) and fabrication costs associated with Apix's targeted production volumes.



EuroCPS Support

CEA-Leti provided its expertise in both circuit design and migration of technology into volume production, and software tools from STMicroelectronics that accelerated design and simulation. This combination of expertise and technology was ideal for ascertaining the optimal integration approach from both technical and economic perspectives, in a much shorter time than Apix could have achieved internally.

Digital Skills

Apix Analytics: portfolio of about 20 key patents for core technology, including the NEMS silicon components, electronics readout and signal-processing algorithms applied to gas chromatography.

Leti: Decades-long experience in electronics and ASIC design, and migration of technology from lab to market

STMicroelectronics: design/simulation tools that take into account DC/AC behavior, noise, power consumption, fabrication and other factors.

Company

Apix is a leading supplier of next-generation miniaturized and modular gas analyzers for industrial analysis and OEM use. (FR) <http://www.apixanalytics.com>



15 employees

Partners:

LETI, STMicroelectronics



Impact/What's next

GOSPEL helped Apix achieve certification of its ChromPix instrument to measure calorific value of natural gas under the OIML R140 standard. This in turn enabled pursuit of business in the fast-growing biomethane renewable energy market in Western Europe and beyond. Apix anticipates ChromPix sales in this sector will rise from about 10 instruments annually to 100 and revenue of at least 1M€ by the end of 2019. In addition, the ASIC can incorporate recent advances in Apix's electronics design, which improve its instruments' detection limits by an order of magnitude and enable gas detection at concentrations below 1ppm. This key achievement opened additional new markets for Apix, such as the odorant gas market, which includes measuring odorant gas injected into natural gas for distribution.