

Knowing the chemistry is the key to innovative sensing materials. Dr. Patrik Ågren starting a new synthesis experiment.



Vaisala Sensor Research - harnessing science for customer gain

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Vaisala's investments in research and development are high. Looking at the comprehensive product offering, it is easy to imagine the scale of product development within Vaisala. But what do we actually do in the field of research?

Committed team of scientists and engineers

Vaisala's Sensor Research group in the Technology Unit is responsible for long-

term applied research in the field of sensing technology. The Sensor Research group consists of eight full-time scientists and engineers. The expertise of the group ranges from surface chemistry to automatic sensor testing, and from advanced material synthesis to thin-film process development. Algorithm development and business analysis are also important aspects of the group's work. The employees' backgrounds are in

engineering, physics and chemistry. This combination ensures a multidisciplinary approach when developing new measurement options for Vaisala's customers.

From ideas to reality

Ideas based on customer needs, market studies, and feedback from Vaisala experts and the research community enter the Vaisala Technology Unit for further evaluation. The task of the Sensor Research group is to screen the feasibility of these ideas for further development. Some ideas materialize in practical experiments or prototypes. The technological and strategic feasibility as well as the economical aspects of a new idea are evaluated. Sometimes, reading scientific papers or discussing the issues with other experts is enough. In other cases, experimental laboratory work is required, or a research project to study the idea further is established.

High risks and rewards

The projects of the Sensor Research group usually contain new, unexplored tasks with high risk level. In this respect their projects differ from typical R&D projects. Some projects may fail because of a lack of technology, or due to being too expensive or complicated to be used in the application. Finding suitable and economically feasible techniques is a big challenge but also a great source of motivation for a researcher.

The timescale of the research projects is longer than in product development. A typical project takes some two to four years to complete, after which, if successful, it will be transferred into a

product or sensor development project. One important task of a research project is to prove the soundness of the technological concept. In order to do this, early prototypes built inside the research projects are tested in the field with trusted end-user partners.

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Vaisala's research efforts continue to produce pioneering results. One example is the recently launched Vaisala Dewpoint Transmitter DMT152, which utilizes the patented DRYCAP® 180U sensor developed by the Sensor Research group. The new sensor extends the measurement range of Vaisala dewpoint transmitters by three orders of magnitude in terms of vapor pressure. Its ability to detect water in dry gases is significantly better than that of other sensors in the market.

State-of-the-art facilities support work

Demanding research work cannot be conducted without suitable facilities and equipment. Vaisala has invested in state-of-the-art facilities and structures to support the Sensor Research group's work: a well-equipped gas sensor test laboratory, a chemistry laboratory, a clean room, a sensor factory, R&D teams, etc. These enable the possibility to construct sensors for research purposes and to gain an understanding of their suitability for real production. In addition to internal facilities, Vaisala benefits from the

utilities of an extremely versatile network of research contractors and partners.

Partnering is key

The Sensor Research group utilizes a wide network of domestic and international research partners. Continuous networking with international researchers provides the group with the possibility to detect new technologies for further development in Vaisala applications. Many fruitful projects have been carried out in cooperation with several Finnish universities as well as with international research groups. The projects may deal with sensor material characterization, processing of some specific parts for Vaisala prototypes, scientific literature evaluation, and so forth.

The group has also received Tekes (the Finnish Funding Agency for Technology and Innovation) and EU funding for long-term research projects.

Continuous learning process

Vaisala sensors are used in very demanding environments: for example, in radiosounding the temperature variation is from +50 °C down to -85 °C, with moisture changes from moist conditions to very dry. In industrial applications the chemical environment may be harsh, and all the materials must withstand these conditions. Understanding the environmental conditions in each application is vital when selecting materials for the sensors. This is why the Sensor Research team actively attends international conferences and seminars in order to learn the latest news in material science, thin-film production and different applications. ■

Long-term stability of transmitter prototypes are tested in controlled conditions. Research scientist Petteri Survo evaluates the recent measurement data.



Inert gas adsorption behavior of sensor materials is measured in our laboratory. Sensor development engineer Jani Pakarinen checking the cooling of the equipment.

