D6.14 Annual press release for general public (24m)

VERIFIN leads a Project on Technology Innovation toward Augmented Reality

A consortium led by the Finnish Institute for Verification of the Chemical Weapons Convention (VERIFIN) of the Chemistry Department of the University of Helsinki completed two of three years with an EU Horizon 2020 Future Emerging Technologies (FET Open) project. This project joins scientists and engineers in Finland (University of Helsinki, Karsa Oy), Germany (University of Hannover, AIRSENSE), Greece (T4i Engineering, National Technical University of Athens), and Spain (ATOS) to support, through a 3.9 M€ grant, research and innovation in the early stages of science and technology. At VERIFIN, the foundations for molecular augmented reality are being established with technologies for chemical measurements, human reactions to knowledge of their molecular environment, and data infrastructure for graphic user interfaces. The project aim is to make the unseen world of molecules visible and accessible to humans across a range of experiences and capabilities. The project is entitled "Gas Ion Distillation and Sequential Ion Processing Technologies for Identification and Visualization of Chemicals in Airborne Vapours" – kicked off in October 2020 as the GIDPROvis project.

In the second year of the project, discoveries and advances were made in Helsinki, Finland on the foundations of ion-molecule reaction chemistry in air at ambient pressure with volatile organic compounds and gas phase protons. *In-silico* models for these chemical reactions were blended with modelling of structures to achieve gas ion distillation (GID). A major milestone was achieved with the first ever proof-of-concept measurements of GID for a binary mixture of vapour substances.

The determination of chemical composition of airborne vapours in an environment (a room, a field or urban place, or even a geographic region) requires advanced, highly capable technology for chemical measurements. In GIDPROvis, a new method for molecular identification of vapours in fieldable technology is under development in Hannover, Germany with low cost, next generation mobility spectrometers made using materials and methods suitable for economic, large-scale production. Molecular identification is made using emerging methods to fragment gas phase ions derived from samples.

In other discoveries and advances, the human responses and risk perception were explored in three countries (Finland, Germany, Greece) and findings showed that humans do not easily recognize the GHS hazard pictograms that are found in everyday household products (e.g., liquid soap, disinfectants, detergents). Layers of communication of our molecular environment will be needed at levels appropriate and selected by users based on their experiences and qualifications.

Researchers have begun to join these different components of technology and human understandings including a data hub and software to provide a first ever demonstration of molecular augmented reality of volatile organic chemicals in a live field test in Helsinki in spring/summer 2023. The project has produced two patent applications and multiple presentations in scientific literature and presentations at international conferences.

More information about the project, as well as access to the publications, can be found at www.gidprovis.eu.