PRESS RELEASE
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ChemStream demonstrates groundbreaking innovations in the development of functional ‘Inks for the future’

Honoring a series of historic scientists for the scientific inspiration they provided.

- LUMIERE - Inkjet inks only visible under blacklight
- HERACLITUS - Continuous flow process development on demand
- DARWIN - 6 evolutionary steps from design to fit for use optical lenses
- LANGMUIR - Adsorption of biobased block copolymers on nano-pigments
- YOUNG - Tailor-made physical properties of 3D-printed objects

Munich, 12 November 2019 - Today at INPRINT, hosted at the Munich Trade Fair Centre, Belgian innovator ChemStream presents a series of developments leading to new generations of functional inks in groundbreaking applications.

On stand 430 ChemStream will show 5 different demos in which their latest developments in the field of inkjet ink development will be exhibited. “Although our research is based on cutting edge technology, we should never neglect the foundations provided by great scientists like Darwin, Heraclitus, Lumiere and others”, says Frank De Voeght, ChemStream’s co-founder and Managing Director, “without their revolutionary insights technology would not be where it is today.” All demos are honoring scientists who provided in some way the initial inspiration for the current developments.
Description of the demos

« LUMIERE »

This demo highlights the marking of objects, either for quality control or for anti-counterfeiting. This mark then needs to be invisible for the user, but easily readable for the manufacturer. This invisible encoding can be achieved by using a fluorescent ink. The fluorescent agent in the ink must thus be transparent under normal lighting conditions but has to illuminate when irradiated by a certain wavelength. ChemStream has the needed expertise for the development of such inks as well for water based, solvent based as for UV-curable based DOD inkjet printing.

In the “LUMIERE” cabinet one can see both 2D and 3D printed samples in which this concept has been integrated. The prints are visible under blacklight but not under visible light.

« HERACLITUS »

Flow chemistry, in its most basic sense, is defined as performing a chemical transformation in a continuous manner by pumping the reagents through a microreactor. In recent decades, flow chemistry gained a lot of interest both in academia and industry. Its increasing popularity is due to a lot of advantages over classical flask chemistry, such as safety aspects. Especially regarding the scalability of photo- and electrochemical reactions, flow chemistry offers numerous advantages. Microreactors are used in the pharmaceutical industry in the drug discovery process, but also for the synthesis of nanoparticles, polymers and bio-substances in the fields of medicine and life sciences. Since the channels in microreactors have dimensions below 1 mm, 3D inkjet printing provides us with a high resolution printing technique that enables us to design and produce microreactors in a very flexible way. In the demopod ChemStream shows some samples that were designed and 3D printed with self-developed inks.
Over the past decade, ChemStream has developed a multitude of dedicated DOD inkjet printing inks for 2D and 3D printing applications. UV Inkjet 3D printing is a unique technology for the digital manufacturing of lenses with optically flat surfaces without the need of a post-processing step such as polishing.

The lenses are produced by printing a few hundred layers of UV-curable ink on top of each other. The development of such inks is very challenging since different properties have to be combined. Firstly, a high transparency and low yellowing must be obtained. Secondly, different concepts must be identified to reach desired physical properties of the printed object such as high hardness, good impact resistance and high refractive index. In parallel, an advanced process development study is needed in order to identify the most optimal 3D inkjet printing strategy. In this context, optimizing and fine-tuning the rheology, jetting performance and photosensitivity of the ink is key. Furthermore, the inks require a high “overprintability” and a fine-tuned wetting behavior in order to enable a smooth and homogeneous surface.

Balancing all these requirements, different generations of prototype inks were developed leading to a final ink composition that has been scaled up by ChemStream up to a few hundred kilograms. Lenses which have been digitally printed with this ink are currently commercialized.
Dispersing agents for making nano-pigment dispersions can be purchased commercially or can be specifically designed and synthesized by ChemStream to guarantee the best possible dispersion stability and tailor-made properties.

The subsequent translation of the developed dispersions into a functional (inkjet) ink is one of the main domains of expertise of ChemStream. In recent years ChemStream has done a lot of research into the development of its own dispersants based on bio-based building blocks. Several side-streams such as chitin, lignin, etc. were validated into a broad range of renewable ink components.

Inkjet 3D printing is a unique technology for the digital manufacturing of multi-material objects with high resolution. By combining different print heads in one single print job, complex objects composed of several interwoven materials having each a different physical (mechanical, optical, electrical, ...), chemical or biological property can be manufactured. This allows the design of objects with unique properties and embedded functionalities. ChemStream develops tailored UV-inkjet 3D printing inks for several industrial applications. For different applications within this field, designing inks which result in materials having different dedicated mechanical properties is of central importance. ChemStream has developed inks for 3D inkjet printing with a broad range of mechanical properties by combining molecular design, a smart choice of building blocks and a statistical approach based on Design of Experiment (D.O.E.).

During the inkjet 3D printing process, low viscous inkjet inks are jetted and cured with UV-light and transformed into a crosslinked polymeric material. On the molecular level, the chemical nature of the building blocks greatly determines the mechanical properties of the printed objects. These building blocks can be combined in order to obtain the desired properties.
On a modular 3D inkjet printer, which enables fast iterations of ink prototypes, ISO-normed shapes such as dog bones are printed. These dog bones are used to measure different mechanical properties such as E-modulus, tensile strength and elongation at break.

**About ChemStream**

ChemStream is an innovative chemical R&D company founded in 2010, that has been very successful in translating material problems in sustainable formulations. The team consists of highly qualified scientists (PhD’s) who can rely on a broad experience of more than 25 years in chemistry, material science, dispersion, coating and digital printing technology. Its employees form a complementary team that is committed to thinking out of the box, which is necessary in order to find unique solutions to their customers' problems.

www.chemstream.be