



Inkjet Development Conference 2023

10-11 May 2023

Crowne Plaza Hotel | Hamburg | Germany



Materials, inks, equipment, techniques and applications

Conference

The IMI Europe Inkjet Development Conference is a two-day technical conference devoted to digital printing technology development, covering materials, engineering and solutions.

The event is aimed at inkjet developers across applications including 3D printing/additive manufacturing, packaging, textiles, graphics, industrial and functional printing.

The conference gives access to key suppliers, technology, information and inspiration from the inkjet industry – everything that you need to develop inkjet technology.

Topics for the event include:

- functional and 3D printing
- colorants
- material dispersion
- resins & polymers
- photoinitiators
- additives & other materials
- analytical equipment & techniques
- processing & manufacturing equipment
- drop & surface behaviour
- application case studies

Networking

The IMI Europe Inkjet Development Conference gives you the opportunity to meet experts from within the inkjet industry as well as from companies using the technology or developing it for their use. With two networking lunches, an evening reception and additional refreshment breaks, there is ample opportunity to meet with key people.

Sponsor Exhibits & Forum

Event sponsors will have their products and technology on display in the breakout area and the Sponsors' Forum enables you to hear short presentations from sponsors on their company and latest news. If you are interested in becoming an event sponsor, please visit the sponsorship page on our website.

Inkjet Development Conference 2023

Wednesday 10 – Thursday 11 May 2023



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Wednesday 10 May 2023

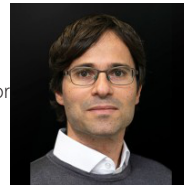
09.00 – 10.00 Conference registration
10.00 Conference begins

A new dawn for electrohydrodynamic inkjet printing as an industrially relevant technology

Dr Julian Schneider

CTO, Scrona

Electrohydrodynamic (EHD) printing has potentially superior printing characteristics to conventional inkjet, and was explored for graphical applications in the 1980s. More recently, new interest has emerged due to applications like printed electronics, but the problems in industrialising the technology remain. EHD printheads are not manufacturable with large nozzle counts, show intense cross-talk and require high operation voltages. Scrona's has created a MEMS-based EHD printhead that eliminates these problems, exhibiting nozzle densities more than five times higher than piezo-inkjet heads. They can be operated at ~60V, making them compatible with massively scaled driving electronics. Cross-talk between individual nozzles is essentially negligible. This finally paves the way to exploit EHD printing as an industrially relevant technology.



Unlocking the potential of inkjet with ultra-high viscosity 3D printing technology

Ramon Borrell

CTO, Quantica

Historically 3D printing has required the choice of single materials with useful characteristics, or the use of multiple materials but with poor characteristics. Quantica's novel multi-material inkjet technology is set to change that, allowing jetting of materials with higher viscosity, up to 380mPa·s at jetting temperature, or ~4000mPa·s at ambient temperature. This allows printing of more complex parts with better properties than with existing technologies. We will introduce the technology, explain how it works and the materials it can handle, then share some operation examples from various industries. We will also unveil a new 3D printer for release at the end of the year – an open system designed for multi-material application R&D.



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Rewriting the rulebook for inkjet printing

Tomas Cerny

Principal Engineer, Xaar
Join Xaar's Tomas Cerny for an overview of Xaar's innovative Ultra High Viscosity Technology. Tomas will be covering the unique capabilities of Xaar's printheads to print high viscosity and highly pigmented inks, including when printing water based inks with the revolutionary Xaar Aquinox, which was launched in November 2022. Tomas will discuss how Xaar's technology makes this possible, as well as the important benefits delivered to OEMs, brands and end users alike.



Fundamentals of print head design and fluid interaction

Dr Bart Hallmark

Consultant

With the fast-paced development of inkjet applications comes the challenge of successfully printing newly-developed inks, for example pigment-based or aqueous systems. The significant changes in ink physical properties and rheology embodied in these new inks can greatly affect their printing efficacy by, for example, limiting print speed or compromising print quality. This short talk goes back to basics and explores the interactions between a printhead and an ink, examines how these interactions are affected by ink properties and introduces "mental models" that allow some of these interactions to be better understood at a qualitative level.



Development of the large format single chip TIJ print heads by using the TFT panel manufacturing process

Dr Daniel Lan

Managing Director, International United Technology (IUT)

We will show a single chip (4.32" / 600 dpi / 2592 nozzles) thermal inkjet (TIJ) printhead designed and manufactured using TFT LCD manufacturing processes, building the heater structure layers and the control driver devices in the glass panel. The channel barrier layer and the nozzle layer are implemented using MEMS processes. The printhead performance, including drop formation and heater lifetime, are currently being studied. A G3.5 LCD glass panel can produce about 288 units of the 4.32" printhead chips, which show a cost advantage compared to TIJ using the Si wafer process.



Multiple scales of manufacturing research to support future inkjet application development

Prof Ronan Daly

Professor of Advanced Manufacturing, University of Cambridge

The Fluids in Advanced Manufacturing research group at University of Cambridge identifies and explores underpinning scientific challenges in a range of manufacturing techniques, including inkjet printing, with progress enabling new applications and supporting translation to industry. Research includes molecular dynamics, surface science, formulation, micro-scale patterning and production processes. We will describe our manufacturing research methodology with examples of two areas of research. Firstly, we describe how the inkjet system imparts large stresses and strains to the working fluid, important for bio-applications, before showing standardised tests to assess this and drive future applications. Secondly, we show integration of ultrafast laser ablation with inkjet printing to explore how hybrid non-contact techniques can allow enhanced levels of control.



Inkjet: R&D to prototype and pilot production

Paul Best

CEO, ImageXpert

In this presentation, ImageXpert will describe strategies for "bridging the gap" between R&D, prototype, and production. ImageXpert will provide guidance based on experience working with over 600 inkjet customers, to showcase some of the specific challenges they encountered, as well as the unique tools and techniques they used to overcome them.

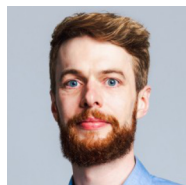


Functional 3D inkjet printing: challenges and opportunities from a material and application perspective

Jan Janhsen

Group Manager, Fraunhofer Institute for Manufacturing Engineering and Automation IPA

In recent years, printhead technologies have evolved significantly. New manufacturers such as Quantica3D, but also established manufacturers, are constantly expanding their printhead portfolio. As a result the range of materials that can be processed is constantly increasing. However, to exploit new fields of application with these technological developments in a systematic also raises new challenges. This begins with the need for extended material characterisation, the adaptation of printing process strategies and all the way to the printed product. Based on practical examples in the field of 3D printed electronics and inkjet printing dental sector, we will take a closer look at these challenges for materials and processes.



Making an impact with inkjet: additive platforms and processes in electronics production

Dr Kai Keller

VP Business Development, Notion Systems

The production of electronic devices is a wasteful undertaking. Notion Systems has shown with a large and diverse installed base in various industries, that additive processes, in particular functional inkjet printing, already has a positive impact toward production efficiency. Inkjet is used to reduce waste and process steps to make the production of current electronic products more efficient and sustainable. In this presentation we will provide insight into the aspects that drive sustainability in electronics production and will discuss application examples.



Panel Discussion : High viscosity fluid printing

The panel will be chaired by a member of the technical advisory board and include industry experts from the conference presenters.

17:30-18:00 Sponsors' Forum

Hear short presentations from the event sponsors.

18:00-20:00 Networking Reception

Join us for wine, beer, canapés and good company!



13.00 – 14.30 Lunch

14:30 Afternoon session begins

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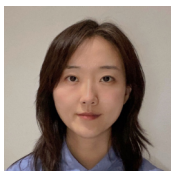
Thursday 11 May 2023

09.00 Morning session begins

Borrowing colours from nature: potentials and challenges of synthetic biology in ink development

Dr Qiaoyi Wang

Senior Material Scientist, Colorifix
Businesses and consumers are more conscious than ever of the need to be environmentally sustainable. Inkjet printing as a prime example of a technology supporting reduction of environmental contamination, has also come a long way to become increasingly sustainable, from reducing the use of VOCs to employing more renewable materials. Synthetic biology is a promising tool to replace petrochemicals with bio-renewables and offers unique opportunities in the colour industry. This talk will introduce the idea of applying synthetic biology to inkjet technology, and the potentials and challenges associated with this emerging field.

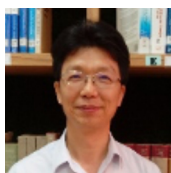


High fixation reactive dyes for digital textile printing

Dr Sam Chen

Leader of Inkjet R&D, Everlight Chemical Industrial Corporation (EIC)

Digital textile printing is an environmentally-friendly technology which can reduce working space, noise, excess dye, electricity, material and waste water etc. compared to traditional textile printing. Until now, all reactive dyes applied with digital textile printing have been the same as those used with traditional printing. These dyestuffs are sufficient for current printing requirements but fixation needs to be improved to let the digital textile printing processing become more green. A series of reactive dyes has been designed and synthesized, achieving a high fixation rate (>80%) compared to current traditional printing dyes (<60%). As well as fixation, all textile printing properties have been evaluated to meet digital textile printing application requirements.



Pigment transfer printing: a new revolutionary transfer process for decorating cotton without pre- and post-treatment

Gijsbert Harmsen

Senior Sales Manager, Neenah Coldenhove

Neenah Coldenhove has developed a new, revolutionary transfer paper and process. With this new transfer paper, textile pigment inks can be printed and transferred onto natural fibers, blends and even nylon. While dramatically expanding the range of applications to a variety of materials, pigment transfer printing significantly simplifies the process and minimises environmental impact. This new development creates deep and vibrant colours, comparable to the brilliance of dye sublimation, but with the advantage of high fastness properties. The process is easy and makes it possible to enter the natural fiber market with limited capital investments.



Plasma for perfect ink jet printing on polymers

Peter van Steenacker

Head of PlasmaXperience, TIGRES

Printing on certain polymers can be quite demanding. Polyolefins like PE and PP have very limited wettability and adhesion properties. To ensure a satisfying printing result, especially with inkjet systems, plasma treatment can improve wettability and adhesion and thus make it possible to get optimal printing results. For film applications, this has been possible with corona systems for some time, but for print to shape applications, the newer plasma nozzles offer new and exciting possibilities. Plasma treatment enables print to shape on difficult materials. The talk will provide an introduction to plasma treatment principles, show the mechanisms for enhancing wettability for enhanced print quality and adhesion.

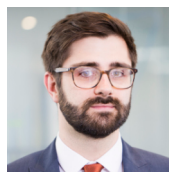


Holistic powder analysis: a one instrument approach for assessing dispersion and sedimentation properties of pigments and additives

Dr Andrew Mellor

Application Market Manager, KRÜSS

The dispersal of powders is a critical factor in ink formulation, especially for solutions containing particulates such as pigments or functional materials e.g. conductive inks. Powder dispersion is broadly a three-phase process beginning with initial wetting, followed by deaggregation of clusters and finally steric stabilisation of dispersed particles. If initial wetting of a given powder is thermodynamically unfavourable, then dispersion simply cannot occur, and consideration of subsequent steps becomes irrelevant. In this talk we present a single device methodology for determining the thermodynamic parameters of immersion for a series of powders and demonstrate how these values correlate with dispersion performance. We then overview how, using the same instrumentation, one can also monitor stability of a dispersed powder via sedimentation characteristics.



12.00 – 13.30 Lunch

13:30 Afternoon session begin

Inkjet solutions for glass and container printing

Simon Czech

Technikum / Democenter, Koening & Bauer Kammann

I will be talking about the challenges in digital printing on glass and containers with a special focus on new developments in direct to shape inkjet. In particular, I would like to talk about how new solutions, such as our „Digital Printed Relief“ process, have already changed the market in a lasting way and what trends we see for the future. I look forward to a joint exchange and exciting expert discussions.



Inkjet printing of precious metals: the untapped possibilities of printed electronics

Dr Konstantin Livanov

CTO, OrelTech

Printed electronics seems like an established and mature field, but it is yet to realise its full industrial and scientific potential. Despite cheerful prognoses, every innovative development on the market is a rare and scrutinized occasion, rather than a business-as-usual. Among the reasons for such a holdback is a complex technological bottleneck that comprises a system of outdated solutions that dominate production lines. This inhibits growth and expansion of printed electronics to new developments and new industries. A method to unblock this bottleneck will require not only the desire to optimise current manufacturing processes, but also a more stringent vision of what the future of printed electronics manufacturing could be, with alternatives to established technologies. One possible direction is discussed in this talk. A combination of nanoparticle-free precious metal inks together with inkjet printing and plasma metallisation leads to new possibilities, new devices and new markets.



The opposing trends of inkjet

Dr Mark Bale

Director, DoDxAct

Whilst the number of inkjet applications continues to grow, there is a split personality that has developed over recent years, whereby printhead makers have to straddle an ever-increasing divide between the requirements of 2D-oriented graphics applications and the demands of 3D-focussed functional materials. Using examples from our laboratory we compare and contrast some application examples to show that although the printhead manufacture and architecture may change there are common principles at work to get the print process to succeed.



Complex rheological characterisation of high viscosity and aqueous inks for reliable jetting

Dr Tri Tuladhar

Principal Consultant, TriJet

The complex dynamic properties of ink are essential to inkjet jetting behaviour, with direct influence on printhead pumping capacity, in-flight jetting & break-up behaviour, meniscus damping profile and ink channel re-filling. In the case of high viscosity and high solid loading inks, we find some jet reliably, while others with similar bulk properties fail. Conversely, in aqueous inkjet inks, the unique bulk and dynamic properties of water influence fluid interactions in the printhead. This poses its own challenge during ink formulation for jetting reliability. We present complex rheological tools and techniques to characterise dynamic properties at the relevant timescale and geometry that can identify subtle differences between good and bad inks. This aids ink formulation and waveform development.



Upcoming IMI Europe Event

Inkjet Summer School 2023

3-7 July 2023

The Møller Centre | Cambridge | UK



Inkjet Academy

Theory of inkjet technology

Monday 3 - Tuesday 4 July 2023

The Inkjet Academy is the ideal introduction to inkjet technology, giving your understanding of the industry an expert start. The course is presented by Dr Mark Bale of DoDxAct and Dr Tim Phillips of Catenary Solutions/IMI Europe.

Fluid Dynamics & Acoustics

How inkjet printing really works

Monday 3 - Tuesday 4 July 2023

This in-depth course couples the characteristics of droplet formation, landing and spreading to the acoustic and fluidic behaviour in the printhead. The course leader is Prof Dr Frits Dijkman, University of Twente, Netherlands.

Jetting Functional Fluids

Rheology, deposition, process & development

Wednesday 5 - Thursday 6 July 2023

This course shows you how to develop an inkjet functional printing application, including printhead selection, formulating an ink with functional materials and jetting functional fluids onto a substrate. The course is led by Dr Neil Chilton & Dr Clare Conboy of Printed Electronics Ltd.

Inkjet Drop Behaviour

Fluid behaviour in printhead, in-flight and on surfaces

Wednesday 5 - Thursday 6 July 2023

This course covers the detailed behaviour of ink drops during inkjet printing, both in flight and when interacting with surfaces, providing a conceptual understanding of complex processes affecting print quality. The course leaders are from TriJet, the University of Cambridge and Advance Inkjet Solutions Limited.

Selecting & Driving Printheads

Drive electronics & waveforms

Thursday 6 - Friday 7 July 2023

Presented by experts from Meteor Inkjet, this course covers everything you need to know about the hardware and software required for driving printheads, including printhead selection, screening algorithms, drive electronics and waveform optimisation.

Inkjet Ink Manufacturing

Manufacturing inks for performance & reliability

Thursday 6 - Friday 7 July 2023

This course covers inkjet ink design for manufacture, testing and reliability, scale-up for manufacture and manufacturing itself. It also covers ink plant design, required equipment, quality control and commercial considerations. Course leaders are Dr Chris Nicholas of Smart Chemistry and Dr Tim Phillips of Catenary Solutions.

Inkjet Development Conference 2023

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IMI Europe Events

If you are interested in presenting at, sponsoring or attending any of our future events, please get in touch: enquiries@imieurope.com

Inkjet Winter Workshop 2024 - A selection of high quality 1.5 day technical courses on topics of interest within inkjet printing.

InnoLAE 2024 - A two day conference highlighting the most innovative and exciting aspects of large-area electronics.

Inkjet Ink Characterisation Practical Course 2024 - A hands on course covering key aspects of inkjet ink physical property measurement and analysis, with the option to bring your own samples to the open lab session for analysis.

Inkjet Summer School 2024 - A selection of high quality 1.5 day technical courses on topics of interest within inkjet printing.

Digital Print Europe 2024 - A two day strategic conference covering market briefings from leading analysts, updates and views from industry pacesetters, perspectives from key end users and new technology introductions from inkjet innovators.