TOPICALITIES

Edited by Markéta Držková

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News & more

PRINTING United Alliance

On 1 May 2020, SGIA, the Specialty Graphic Imaging Association primarily serving the graphics, industrial and apparel decorator segments, and PIA, Printing Industries of America primarily serving the commercial printing segment, officially merged and became the largest member-based printing and graphic arts association in the United States. The alliance now works on integration and streamlining of programmes and services from both organisations to better support the graphic arts community.

Much effort has been recently put to activities reacting to the COVID-19 pandemic. In March, PIA demanded print to be considered essential service. Printers and packagers have been specifically included as essential workers in the updated Guidance on the Essential Critical Infrastructure Workforce released on 17 April. Basic facts and situation reports, as well as practical information for both business owners and employees in the graphic arts industry, are provided to assist with safety and recovery.

The countdown to the next drupa continues

While a year ago it was less than 12 months to drupa 2020 and the list of exhibitors featured about 14 hundred companies, the countdown had to be reset due to the COVID-19. Now, ten months before drupa 2021, rescheduled to the end of next April, almost 17 hundred exhibitors are registered. The companies come from over 50 countries, with Germany, China and Italy being the most represented ones. Across the product categories, about 50 exhibitors are currently registered for premedia and multichannel segment, over a hundred for future technologies, and a few hundred in each of the traditional sectors covering prepress and print, post-press, converting and packaging, materials, and equipment, services and infrastructure.

Seventh drupa Global Trends report

The 7th edition of the drupa Global Trends report is based on a survey conducted before the outbreak of the coronavirus, in November 2019. The results published in April build on the responses of 581 printers and 189 suppliers, i.e. a bit less than in the previous edition. When examining the economic confidence, the global net balance was positive, although in the case of printers it was mainly thanks to positive numbers from North America and Europe. The similar pattern across individual regions is seen when comparing the change in revenues, prices, margins and utilisation. Overall, the printer economic confidence shows a decreasing trend in all regions except Africa, where it returned from negative numbers in previous years to a neutral net balance. The decrease is reported in all markets considered, because, besides the market-specific pressures, they all are impacted by broader economic, political and environmental factors. When taking into account the current situation, the need for innovative approaches and adaptability to an ever-evolving demand for print is highlighted.

The annual Intergraf reports

This year, Intergraf, the European Federation for Print and Digital Communication based in Brussels, celebrates its 90th anniversary, being established in Berlin, Germany in 1930 as the International Bureau of the Federations of Master Printers, transformed to Intergraf in 1984, and having a new logo and company brand since last year.

The 2020 Intergraf Economic Report is now available, summarising the available statistical information on the European graphic industry and the related markets, with a new section presenting socio-economic data. The information on current trends in selected European countries is this time provided by Intergraf's member federations from Bulgaria, Denmark, Estonia, France, Germany, Italy, the Netherlands, Norway, Portugal, Sweden, and United Kingdom. Besides the Smithers European print market review with a 4-year forecast (2019–2024), the Intergraf report considers the print market outlook with respect to impacts of Brexit and COVID-19, presenting the UK share in EU print market, UK trade of printed products with EU-27, current European macro-economic forecasts, short-term impacts of COVID-19 situation on advertising, and post-COVID-19 consumption patterns.

These topics are discussed also in the Intergraf Activity Report 2020, together with the restrictions on door-drop advertising, as well as on direct mail and the interpretation and implementation of the General Data Protection Regulation (GDPR) in general, future requirements for printed packaging connected with the introduction of extended producer responsibility schemes and rules on packaging design, review of regulation applicable to food contact materials, the new industrial emissions limit values, and more.

Recent printing-related research at MIT

A study from the Massachusetts Institute of Technology analysed how the perovskite-based solar panels can become competitive with silicon technology. The team from MIT and their co-workers recommend to start with higher-value niche markets and then expand gradually.

Soft, electronically active polymers are 3D-printed in research towards flexible neural implants and other electronic devices at the Department of Mechanical Engineering. To make the low-viscosity conducting polymer solution 3D-printable, it was processed by freeze-drying and embedding into a hydrogel.

Extensive research on 4D printing is carried out by the Self-Assembly Lab and its collaborating partners. Multi-material 3D printing is used to form the objects designed to transform over time as a result of specific conditions, such as due to mechanical stress, water absorption, light exposure, etc.

A method for printing 3D objects that can predictably control living organisms is developed by the Media Lab. In the proof-of-concept experiments, customised combinations of resins and chemicals were printed using a commercially available multi-material inkjet-based 3D printer and the resulting object was spray-coated with a hydrogel containing biologically engineered bacteria. The chemicals then activate certain responses in these microbes, e.g. displaying specific colours or fluorescence. Such hybrid living materials can find a number of applications, including highly specific medical treatments or smart packaging that can detect contamination.

The objects with the structure and function of a breadboard integrated onto their surfaces are 3D-printed by the Computer Science and Artificial Intelligence Laboratory to facilitate testing of circuit functions and user interactions with products such as smart devices and flexible electronics.

Recently completed EU-funded Horizon 2020 projects

The projects finished in 2019 include the large project PI-SCALE – Bringing flexible organic electronics to pilot innovation scale, coordinated by the Dutch research organisation TNO and presented in this section in JPMTR 5(2016)1, and R2R Biofluidics – Large scale micro-and nanofabrication technologies for bioanalytical devices based on R2R imprinting, coordinated by the Austrian FH JOANNEUM. The projects funded within the business innovation support include the two-year SUPPLEPRINT (Super productive line printing inkjet), as well as the short-term ones, such as ATLANT3D (Atomic layer nanoprinter, for rapid micro- and nanoprototyping of complex multi-material 2D/3D structures with high-resolution), T-Sense (Development of temperature sensitive labels for products in cold supply chain), Ribler Technology (Green revolution in bookbinding for print on demand), and PIPER (Printing of ultra-thin, flexible perovskite solar cells and its commercial application). Among the projects funded under the European Research Council (ERC), the Swedish Chalmers University of Technology received the starting grant for its five-year project ThermoTex – Woven and 3D-printed thermoelectric textiles, finished this May. Selected projects are introduced in more detail below.

3DTransducers: Functional 3D printed transducer and sensor systems

The UK University of Strathclyde received the ERC proof-of-concept grant for its 18-month project, utilising the 3D printing techniques from the SA-SATIN (Soft and Small: Acoustic Transducers Inspired by Nature) ERC project and finished in December 2019. It demonstrated the fabrication of a fully 3D-printed working piezoelectric microphone, comprising conductive, piezoelectric and inert polymer-based parts, in a single integrated build.

HEROIC – High-frequency printed and direct-written organic-hybrid integrated circuits

This five-year project of the Italian IIT research institute finished in this March received the ERC starting grant to radically advance and expand the applicability of polymer-based printed electronics. The published results include complementary organic logic gates on a plastic formed by self-aligned transistors with gravure and inkjet printed dielectric and semiconductors, transparent and highly responsive phototransistors, fully printed photodiodes, ultra-conformable freestanding capacitors, and more.

NECOMADA – Nano-enabled conducting materials accelerating device applicability

This three-year project coordinated by the UK Centre for Process Innovation and finished in December 2019 comprised the development of advanced functional materials for the formulation of customised conductive inks and flexible adhesives, compatible with the roll-to-roll application on flexible substrates via a high-speed pilot line.

InSCOPE – International smart collaborative open-access hybrid printed electronics pilot line

Within another project coordinated by TNO (January 2017 to March 2020), the InSCOPE pilot line comprising printing, component assembly and post-processing was set up and employed for a demonstration of the lighting wall, haptic dashboard, interactive elevator and smart blisters.

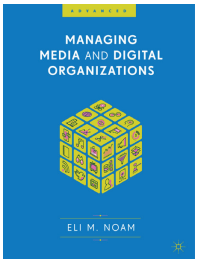
Bookshelf

Managing Media and Digital Organizations

Written by an experienced writer and expert in the field, this comprehensive book applies an interdisciplinary approach and provides an in-depth insight into management across the media, communications and information sector. The first part defines the position of media management and introduces the fundamental concepts, presenting the macro-environment of the information economy and the basic microeconomic characteristics of media and information. These include the specific cost structure of media products and services, network effects, divergent cost trends in the value chain, the implications of accelerating progress, excess supply, price deflation, a convergence of technology, non-normal distribution of success, importance of intangible assets, lower emphasis on profitability by many creators, the public-good aspect of information, and high government involvement. Individual chapters in the main three parts of the book then cover the key management functions related to activities in production, marketing and controlling, along with their challenges. All approaches are clearly explained and supported by facts and practical examples. To better illustrate the presented content, a case study following a major media company is included for each chapter. Also, there are review materials to facilitate the use of the book in a course setting.

The main content begins with a chapter on production management. First, it introduces the media production, industries, including print publishing, and success factors. Then it explains the methods and tools for production planning and control. It also covers revenue shares and the impact of next-generation technology. The next chapter discusses technology drivers and trends with their effect on media and communications; it also presents the approaches to research and development management. The following two chapters deal with human resource management, including a discussion of employment in the digital economy, and financing aspects, such as the ownership, partnerships, various funding types, risk reduction strategies and capital structure. Further, intellectual asset management, entertainment law and media regulation are thoroughly discussed, along with the demand analysis and market research for media and information products. The next part brings three chapters that cover in detail the marketing, pricing and distribution of media and information. They deal with product design, positioning, promotion, advertising, marketing performance, pricing strategies, measuring price sensitivity, price discrimination, legal aspects of pricing, distribution networks, distribution management, logistics, distribution channel strategies, etc. Finally, the last part includes the chapters on accounting and strategy planning in media and information firms, discussing profit, liabilities, budgeting, business strategy and internal assessment, among others, and followed by the concluding observations.

While this book is aimed at graduate courses and the professional market, a shorter version for the college level, Media and Digital Management, has been published as well.

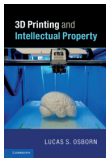


Author: Eli M. Noam

Publisher: Palgrave Macmillan
1st ed., February 2019
ISBN: 978-3-319-71287-1
687 pages, 111 images
Hardcover
Available also as an eBook

3D Printing and Intellectual Property

Author: Lucas S. Osborn



Publisher: Cambridge University Press
1st ed., September 2019
ISBN: 978-1107150775
242 pages, Hardcover
Also as an eBook

Considering the major intellectual property systems around the world, this book focuses on the issues raised for patent, design, trademark and copyright law by 3D printing, offering ideas for a way forward. First, it outlines the capabilities and effects of 3D printing technology, explaining the way it works and why it matters, and provides the basics of intellectual property law and policy. The next part deals with patents – their applicability to a 3D-printable file and their direct, individual, "digital" and indirect infringement. Further, the book discusses the challenges brought by 3D printing due to the dissociation between design and manufacturing in connection to trademarks, as well as the boundary between copyright and patent protection of 3D-printable files. The last two chapters look at the concepts of design rights, tangibility and free expression, proposing how intellectual property protection can be optimised to better serve as an incentive to innovate.

Jill Enfield's Guide to Photographic Alternative Processes
Popular Historical and Contemporary Techniques

Author: Jill Enfield

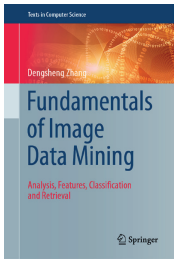
Publisher: Routledge
2nd ed., March 2020
ISBN: 978-1138229068
374 pages
Hardcover
Also as an eBook

This book on alternative processing of photography is now fully updated to reflect the fast development of technology. The recognised author presents, among others, the

Fundamentals of Image Data Mining
Analysis, Features, Classification and Retrieval

Building upon the author's extensive research in this field, the book provides a timely insight into the approaches to image data mining and helps to gain an understanding of the presented techniques for image analysis, feature extraction, machine learning and image retrieval. The theoretical treatment is complemented by real data and working examples.

The first part explains the Fourier transform, including the short-time Fourier transform and Gabor filters, and wavelet transform. It also demonstrates how these fundamental transforms can be used to capture key information or features in an image. The second part presents the methods for extraction of colour and text features. Further, it describes shape representation and region-based shape feature extraction. The third part then deals with image classification and annotation using four powerful learning machines, presenting the Bayesian classification, support-vector machine, artificial neural network and image annotation with a decision tree. Finally, the fourth part is dedicated to image retrieval and presentation, providing the details on the techniques used for image indexing, ranking and presentation.



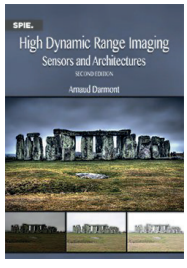
Author: Dengsheng Zhang

Publisher: Springer
1st ed., May 2019
ISBN: 978-3-030-17988-5
314 pages, 202 images
Hardcover
Available also as an eBook

High Dynamic Range Imaging
Sensors and Architectures

Unlike at the time of original publication, much more information on the topic is published now. In ten chapters, this book provides expert knowledge of high dynamic range (HDR) image sensors and techniques for technical applications, in this edition extended by the coverage of CMOS pixel and image sensor design concepts and circuits. After presenting the applications needing a higher dynamic range, main dynamic range concepts and mathematical descriptions, it deals with the existing hardware and software methods to extend the dynamic range, with an emphasis on the commercially utilised ones. Further, the book discusses the optical limitations and automatic HDR control and describes HDR file formats and testing of HDR sensors, cameras and systems. It also covers the dynamic range in infrared and 3D imaging devices and briefly discusses HDR figures of merit.

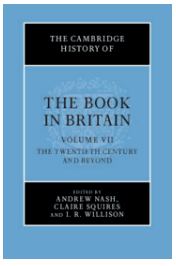
Author: Arnaud Darmont



Publisher: SPIE Press
2nd ed., April 2019
ISBN: 978-1-5106-2278-4
184 pages
Softcover
Available also as an eBook

The Cambridge History of the Book in Britain
Volume 7: The Twentieth Century and Beyond

This book is the final volume in the series examining the creation, material production, dissemination and reception of texts in Britain from Roman times to present. Part I deals with the material book and its manufacture, following the development of materials, technologies and the printing industry since the beginning of the 20th century, the format and design of books with respect to illustrations and typography, up to the digital book. Part II is focused on the social, cultural and economic aspects of authorship, publishing, distribution, bookselling, reading and ownership of the book. Part III maps individual market sectors and types of books over the course of the period. Represented sectors or subject areas range from children's books, schoolbooks and textbook publishing, to popular science, popular history, religion, publishing for leisure, museum and art book publishing, music, university presses and academic publishing, scholarly journals, information, reference and government publishing, maps, cartography and geographical publishing, up to magazines and periodicals, comics and graphic novels, i.e. the areas linked more to the newspaper than the book industry. Part IV presents the essays dealing more conceptually with the book in wartime, imperialism and post-imperialism, the book and civil society, sex, race and class, counter-culture and underground, the mass market, intellectual property, books and other media, book events and environments.



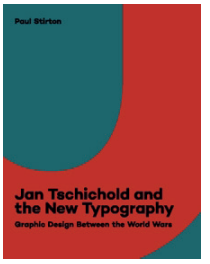
Editors: Andrew Nash, Claire Squires, I. R. Willison

Publisher: Cambridge University Press
1st ed., June 2019
ISBN: 978-1-107-01060-4
780 pages, 17 images
Hardcover
Available also as an eBook

Jan Tschichold and the New Typography
Graphic Design Between the World Wars

This volume highlights the first decades of a career of Jan Tschichold, admired as one of the most influential designers who helped to shape the new typography. Besides his works from this time, the volume is illustrated with images from Tschichold's private collection of illustrations, advertisements, catalogues, posters, magazines and books by both recognised and lesser-known artists and designers. Their analysis provided a new perspective on the work of Jan Tschichold and also on the significant role of advertising designers, members of the group known as "The Ring", in developing a more dynamic, yet balanced language of modern graphic design.

Author: Paul Stirton

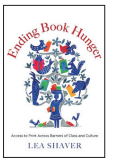


Publisher: Yale University Press
1st ed., April, 2019
ISBN: 978-0-300-24395-6
272 pages, 100 images
Softcover

enhanced inkjet prints, utilisation of darkroom techniques in digital image processing, as well as transforming images to 3D installations, showing how all techniques and approaches can be combined to achieve the desired effect.

Ending Book Hunger
Access to Print Across Barriers of Class and Culture

Author: Lea Shaver

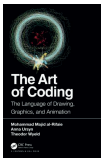


Publisher: Yale University Press
1st ed., February 2020
ISBN: 978-0300226003
224 pages, Hardcover
Also as an eBook

Based on her research on distributive justice aspects of copyright, Lea Shaver stresses the importance of the equal access to books and other educational materials and explores the possible solutions to make them affordable in all languages and regions of the world. The book discusses various distribution models, supply chain innovations, digital publishing, open licenses, copyright exceptions, permissions, and more.

The Art of Coding
The Language of Drawing, Graphics, and Animation

Authors: Mohammad Majid al-Rifaie, Anna Ursyn, Theodor Wyeld



Publisher: CRC Press
1st ed., February 2020
ISBN: 978-0367900373
318 pages
Hardcover
Also as an eBook

The book provides the introduction to coding in general and coding for art, design and applications with different programming languages and data structures. The solutions to the visually oriented tasks show how to create 2D and 3D graphics, modify an image, change the displayed output in time and also how to achieve interactivity and visualise inputs. The complete codes are available online.

Internet of Things From Hype to Reality The Road to Digitization

Authors: Ammar Rayes, Samer Salam

Publisher: Springer
2nd ed., November 2018
ISBN: 978-3319995151
373 pages, 128 images
Hardcover
Also as an eBook

This text presents a timely overview of all important aspects concerning the Internet of Things (IoT) – its core concepts, internet, sensors and actuators, requirements for networking protocols, services, security and privacy, the use cases, the blockchain and open source in IoT, industry organisations and standards.

Applications of Fluoropolymer Films Properties, Processing, and Products

Author: Jiri George Drobny

Publisher:
William Andrew
1st ed., February 2020
ISBN: 978-0128161289
314 pages, Hardcover
Also as an eBook

This book provides information about the high-performance films based on fluoroplastic polymers, including the section discussing their printing.

Fluoropolymer Additives

Editors: Sina Ebnesajjad, Richard Morgan

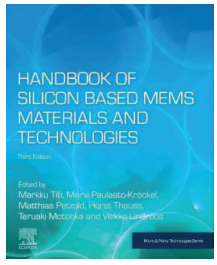
Publisher:
William Andrew
2nd ed., February 2019
ISBN: 978-0128137840
304 pages, Hardcover
Also as an eBook

Published in the same series as the book introduced above, Plastics Design Library, this one presents fluorinated additives, including their applications in printing inks.

Handbook of Silicon Based MEMS Materials and Technologies

With over 130 contributors, this book provides a broad overview of MEMS (micro-electro-mechanical systems) and addresses all areas of concern for the MEMS industry, considering the increasing speed of its development during the last years due to the intense competition and larger business volume, dominated by the consumer business sector. Besides the established technologies, the prospective and emerging ones are also introduced. For the third edition, the content has been reorganised, updated and extended by seven new chapters, reflecting the increasing importance of packaging and reliability of the MEMS devices, and a new part dedicated to process integration and case studies. The individual parts deal with the relevant properties and processing of silicon, modelling methods and micromachining technologies, briefly mentioning also the use of 3D printing technologies and inkjet printing, then with the encapsulation and integration of MEMS, their characterisation, and finally with the examples of applications, namely with accelerometers, gyroscopes, pressure sensors, microphones, micromirrors, and MEMS above CMOS and optical MEMS sensor concepts.

Editors: Markku Tilli, Mervi Paulasto-Krockel, Matthias Petzold, Horst Theuss, Teruaki Motooka, Veikko Lindroos

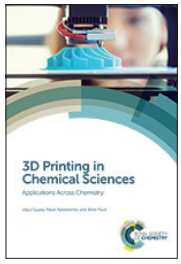


Publisher: Elsevier
3rd ed., April 2020
ISBN: 978-0-12-817786-0
1026 pages
Softcover
Available also as an eBook

3D Printing in Chemical Sciences Applications Across Chemistry

The authors of this book have attempted to cover as much of the recent research as possible to demonstrate the impact of 3D printing within the chemical sciences. First, they briefly introduce 3D printing and 3D printing techniques, namely stereolithography, selective laser sintering and melting, inkjet printing and fused deposition modelling. Two chapters then describe 3D printing of micro-fluidic and macro-fluidic devices and 3D-printed analytical detectors, including the smartphone optical-sensing platforms, flow-cells for mixing, reaction and detection, electrochemical detector cells and printed electrodes. The following chapters bring an overview of 3D printing in analytical chemistry, pharmaceutical chemistry, biochemistry, synthetic chemistry and physical chemistry. The last chapter presents 3D printing in different areas of chemical education. The authors also discuss the related properties of materials for 3D printing – their biocompatibility, as well as chemical and thermal stability.

Authors: Vipul Gupta, Pavel Nesterenko, Brett Paull



Publisher: Royal Society of Chemistry
1st ed., April 2019
ISBN: 978-1-78801-440-3
250 pages
Hardcover
Available also as an eBook

Bookshelf

Academic dissertations

Device Patterning, Contact, Transport, and Light Emission of Halide Perovskite

Doctoral thesis – Summary

Author:
Chun-Ho Lin

Speciality field:
Electrical Engineering

Supervisor:
Jr-Hau He

Defended:
29 January 2019, King Abdullah University of Science and Technology, Computer, Electrical and Mathematical Sciences and Engineering Division Thuwal, Kingdom of Saudi Arabia

Contact:
chunho.lin@kaust.edu.sa

To address the issues preventing commercial applications of halide perovskite in optoelectronics, the research work within this thesis comprised the fundamental study on its orthogonal patterning, metal contact, carrier transport and light emission stability. After introducing the background on perovskite technology, the dissertation presents the experimental methods employed for perovskite synthesis, perovskite device fabrication, material and morphology characterisation, as well as the other experimental work. The following four chapters then discuss the results of individual studies. The first one describes an orthogonal electron beam lithography process enabling to fabricate halide perovskite nanodevices. Based upon the examination of the chemical orthogonality of 12 solvents on $CH_3NH_3PbBr_3$ and $(C_6H_5C_2H_4NH_3)_2PbI_4$, i.e. the 3D and 2D single-crystal perovskites, chlorobenzene was utilised to dissolve the poly(methyl methacrylate) resist layer and hexane to clean the samples without degrading the perovskites. A stable 2D perovskite single-crystal photodetector with the channel length of 380 nm was successfully fabricated. In the second experiment, 3D perovskite single crystals with different metal electrodes were prepared to study the transport behaviour at the metal–semiconductor contact interface. It was found that the current injection follows thermionic emission theory, and the Schottky barrier heights for Au, Pt and Ti were determined. The third study gained further insight into the carrier transport behaviour of the bulk perovskite single crystal thanks to a direct measurement using the transfer length method. Finally, highly stable perovskite nanowires for colour-tunable luminescence were fabricated in the nanopores of anodic aluminium oxide substrate using an inkjet printing technique. The photoluminescence operation lifetime of 250 h (19 % degradation) and long-term stability of 100 days (30 % degradation) were achieved.

Coffee-Ring-Effect Based Self-Assembly Mechanism for All-Inkjet Printed Organic Field Effect Transistors With Micron-Sized Channel Length

Doctoral thesis – Summary

Author:
Chadha Bali

Speciality field:
Functional Inkjet Printing

Supervisors:
Arved Carl Hübler
Ulrich Sigmar Schubert

Defended:
18 June 2019, TU Chemnitz, Mechanical Engineering, Institute for Print and Media Technology Chemnitz, Germany

Contact:
chadha.bali@outlook.com

This thesis, focused on organic field-effect transistors, aimed to minimise the channel length in order to enhance the transistor performance beyond the limits given by the resolution normally achieved in the field of printed electronics. The work tested several possible fabrication routes utilising solution-processed organic materials and based solely on printing and then systematically investigated the influencing factors to optimise the selected approach, which employs the coffee-ring effect to form small hydrophobic twin-lines from printed nanoparticle dispersions.

The first part introduces the topic, provides an overview of related methods and mechanisms, as well as the current knowledge in the field, and then describes the preliminary experiments towards the fabrication of a small-gap electrode. The tested methods included the spontaneous gap formation at contact line proximity during sintering and four methods based on dewetting on thin lines, employing boundary definition by a solvent with a high

boiling point, spontaneous gap definition between a liquid contact line and nanoparticles, and dewetting on thin solid lines created either by the slip-stick-motion or by the coffee-ring effect. Based on the overall feasibility and effectivity in terms of time and costs, further work was focused on the last-mentioned one. The development of a theoretical model for twin-line deposition comprised calculation of the deposit ring volume, considering the layout and material parameters, two methods of calculation of the rivulet width, and geometric approximations of the deposit ring cross-section using triangular and circular models. The resulting models were used in single parameter simulations, which included the influence of the number of lines, line length, concentration, drop volume and contact angle. Building upon these findings, the second part deals with the main experiments. After introducing the materials and techniques used, the dissertation describes printing of multiple-droplet line structures to achieve hydrophobic twin-lines and evaluates the practical relevance of the developed model, summarising the influence of material choices and experimental parameters on the fabricated electrodes. Finally, the fabrication of small-channel organic field-effect transistors is presented. Here, also the optimisation of dielectric and semiconductor layers deposition and comparison of different electrode configurations are discussed.

Doctoral thesis – Summary

Author:
Stephan Behnke

Speciality field:
Sheet metal printing

Supervisors:
Edgar Dörsam
Peter Groche

Defended:
16 October 2019, Technical University of Darmstadt, Department of Mechanical Engineering, Institute of Printing Science and Technology Darmstadt, Germany

Language:
German

Original title:
Untersuchungen zum Blechdruck für Metallverpackungen

Contact:
stephan.behnke@web.de

Studies on Sheet Metal Printing for Metal Packaging

The primary goal of this thesis was to streamline the production of decorated metal packaging, which typically requires several runs and separate machines for varnishing and printing. To enable direct printing with UV-curable inks, the research involved the investigation of surface properties of tinplate and their modification using UV pretreatment to increase the ink adhesion. One of the objectives also was to study the influence of post-processing to take into account the stress during forming.

The dissertation introduces the topic and metal packaging, summarising its types, manufacturing, structure and required properties with a focus on the three-piece design. It also describes the substrate and coating materials, their drying or curing and surface properties, as well as the production lines used for decoration. Three chapters then present the experiments and their results. The work employed the methods for characterisation of wetting and adhesion, X-ray photoelectron spectroscopy to analyse the organic compounds present on a tinplate surface before and after the pretreatment, as well as the methods for characterising formability and other properties. First, 13 different tinplates were printed with a UV-curable white ink specially formulated for this experiment. In the next step, six ink compositions from the same producer were tested with five selected tinplates. On the basis of these results, the ink formulation was further optimised and three ink compositions were used in the laboratory study on formability to test the influence of the mechanical deformation stresses occurring during the post-processing with regard to ink adhesion on five types of tinplate. The impact of sterilization was also investigated. The following experiments with one ink and four tinplates then examined the effect of different pretreatment processes (five methods of UV treatment, thermal treatment, atmospheric-pressure plasma treatment) on wetting and adhesion. Finally, the pretreatment using the xenon excimer lamp (172 nm) was further investigated. The influence of the materials used, the formability test methods and the photochemical mechanisms of UV pretreatment are thoroughly discussed, as well as the resulting line configuration, which allows complete printing and varnishing of tinplate within two runs.

Events

NANOTEXNOLOGY 2020

nano texnology Thessaloniki, Greece
4–11 July 2020

This year, the organisers offer both live and virtual event, according to participants' preferences and possibilities. All three weekend days that frame the programme are reserved for the 14th International Summer Schools on Nanosciences & Nanotechnologies, Organic Electronics and Nanomedicine, with the courses mostly in virtual mode. The sessions of the 17th International Conference on Nanosciences & Nanotechnologies are scheduled for the whole workweek and opened by the Thomas Webster's keynote 'Nanomedicine and COVID-19: commercializing improved prevention, diagnostic, and therapeutic approaches'. The 3rd International Conference on 3D Printing, 3D Bioprinting, Digital & Additive Manufacturing is organised in the scope of two EU-funded Horizon 2020 projects, SMARTLINE – Smart in-line metrology and control for boosting the yield and quality of high-volume manufacturing of organic electronics, and CORNET – Multiscale modelling and characterization to optimize the manufacturing processes of organic electronics materials and devices. Its Wednesday sessions deal with bioprinting, advanced materials, such as the phosphorescent bio-based resin, characterisation of their properties, and more. Four days of the 13th International Symposium on Flexible Organic Electronics include the keynotes 'Molecular switches at interfaces and in junctions: a theoretical perspective' by Jerome Cornil, 'Emissive and charge-generating donor–acceptor interfaces for organic optoelectronics with low voltage losses' by Koen Vandewal, 'Using molecular doping to enhance the performance of organic optoelectronics' by Thomas D. Anthopoulos, 'Hybrid perovskite crystallization: from in-situ diagnostics to robotic experimentation' by Aram Amassian. The plenary session of the event features Norbert Koch on 'Controlling hybrid inorganic/organic electronic materials interfaces' and Joachim P. Spatz with a lecture 'Matter-to-life: how to build a cell'.

High-Performance Graphics 2020

https://www.highperformancegraphics.org
13–16 July 2020

High-Performance Graphics 2020
July 13-16, hosted online

As many of the events taking place in these months, also this conference in computer graphics is held as a fully virtual event, with the video streams freely available online. Online interactions with speakers are possible after registration (for a small fee). Among the keynotes, Chris Wyman reviews real-time ray tracing and lighting algorithms, while system-level challenges of hardware-accelerated real-time ray tracing are addressed by Holger Gruen; further, Yaser Sheikh describes the early steps towards achieving photorealistic telepresence, Wenzel Jakob discusses differentiable rendering and Manolis Savva 3D graphics systems for simulation. The technical papers deal with high-performance and special rendering, image-based computing, hardware architectures, and more.

Further changes in the calendar of events for 2020

From the events that were originally scheduled earlier this year, the Inkjet Ink Characterisation Practical Course will take place in Hamburg, Germany on 13–16 October 2020 and the FuturePrint fair in São Paulo, Brazil on 24–27 November 2020. The new date still has not been set for the 33rd International Publishers Congress in Lillehammer, Norway, the Printed Electronics Europe in Berlin, Germany, and the CPES2020 conference in Brampton, Ontario, Canada, among others.

Because the COVID-19 situation remains serious in several places worldwide and the restrictions are lifted only to some extent in many countries, almost all events that were planned for the third quarter of 2020 are also impacted.

One of the events fully cancelled for this year is the 47th International iarigai Conference that was to be hosted by Clemson University in Greenville, South Carolina, USA. As the 2021 annual conference should be held in Greece, Clemson University will probably host the next conference in 2022. Other events rescheduled to the next year include the Labelexpo Americas and Brand Print Americas shows (23–25 March 2021 in Chicago, Illinois, USA), the Unique 4 + 1 fair (4–6 September 2021 in Leipzig, Germany), another two co-located events, The Print Show and The Sign Show in Birmingham, UK (28–30 September 2021), and the 11th International Conference on Flexible and Printed Electronics (ICPFE, to be held from 28 September to 1 October 2021 in Niigata, Japan). The Print Event in Minneapolis, Minnesota, USA, the 6th Digital Textile Congress in Ghent, Belgium and the 12th Image Processing and Communications conference in Bydgoszcz, Poland belong to those with a date yet to be announced.

PRINTING United Alliance Events

A series of the Color Management Boot Camps, organised originally by SGIA and now by the PRINTING United Alliance, take place during July and August 2020 as the online workshops conducted by certified instructors.

WAN-IFRA Events

The July events start with the two supported by the Google News Initiative – the webinar presenting the data-driven journalism skills on 2 July and the briefing on Round 2 of the 12-month programme for local and regional news publishers, Table Stakes Europe, on 8 July. The 2020 editions of the Asian Media Leaders Summit (20–23 July) and LATAM Media Leaders eSummit for Latin America (27–29 July) are then organised also as virtual events, discussing the decline in advertising revenues, post-COVID media outlook along with the appropriate business and editorial strategies.

In September, an online edition of Digital Media Africa 2020 is organised (8–9 September), with free registration and the African Digital Media Awards on the first day. Later, several Indian events are held online as well: the 28th annual conference WAN-IFRA India 2020 Printing Summit and the Future of News Summit (21–22 September), followed by the Indian Media Leaders eSummit (23–24 September).

IEEE VLSI DCS 2020
2nd International Conference on VLSI Device, Circuit and System

http://site.ieee.org/sb-msitceds
18–19 July 2020

A wide range of topics covered by this event dedicated to VLSI (very large-scale integration) technology include also the flexible, printed, large-area and organic electronics, advanced nanomaterials and emerging devices.

CGDIP 2020
4th International Conference on Computer Graphics and Digital Image Processing

https://www.cgdip.org
24 July 2020

While originally planned as a three-day event held jointly with the Workshop on Applications and Technologies of Computer Vision, the 2020 edition had to be eventually transformed to the online conference organised during one day. Among the speakers, Paul Craig has the invited lecture presenting the research investigating how information visualisation could be better supported on mobile devices and demonstrating the potential of information visualisation techniques to make even larger-scale data more accessible for mobile device users and users in multi-device environments.

CIE Tutorials on Colorimetry and Visual Appearance

http://cie.co.at
28–29 July 2020

This summer, the International Commission on Illumination (CIE) offers the set of 19 tutorials, with the pre-recorded presentations available for viewing from 17 July and the opportunity to submit questions to be answered during the live question and answer sessions – those for CIE colorimetry and 3D printing on 28 July and those dealing with the measurement of advanced BRDF (Bidirectional Reflectance Distribution Function), sparkle and graininess on 29 July. The registered participants also receive a bundle of five CIE publications on the tutorial topics and have an option to acquire another one at a substantially discounted price.

Four 30-minute colorimetric tutorials include the introduction to CIE colorimetry, explaining the main concepts. The other topics deal with colorimetric representations based on cone fundamentals, spectra of typical LED lamps together with an explanation why one LED-illuminant is under study to complement the CIE standard illuminant A for calibration use in photometry, and the CIE 2017 Colour Fidelity Index.

In connection with 3D printing, besides a brief introduction of the research strategy for measurement and reproduction of 3D objects, four 20-minute tutorials cover the recent development of 3D colour printing technologies and colour appearance reproduction, the image-based colour measurement for 3D objects and factors that affect its accuracy, assessing chromatic adaptation in a 3D scene, and colour difference evaluation for 3D-printed objects.

From five tutorials on BRDF, three 20-minute ones explain the basics of reflectance and BRDF measurements, polarisation effects in BRDF measurement and an approach to BRDF measurement in the area of the specular peak; the other two present the use and challenges of BRDF measurement in automotive and cosmetic industries, each in 15 minutes.

The last set of tutorials includes a brief description of the physics behind sparkle and graininess, the evolution of automotive coatings and the challenge of texture measurements, characterisation of visual texture by reflectance measurements, and the design of experiment for visual assessment of sparkle and graininess (in 20 or 25 minutes).

FLEPS 2020
IEEE International Conference on Flexible and Printable Sensors and Systems

https://2020.ieee-fleps.org/
16–19 August 2020

This event organised by the Institute of Electrical and Electronics Engineers also had to be transformed into a virtual meeting for its 2nd edition. The keynote speakers feature Joseph Wang, sharing his deep insight into the flexible printable bioelectronics devices from wearable biosensors to on-body biofuel cells, John Rogers, presenting the soft electronic and microfluidic systems for the skin enabled by the recent advances in materials and technology, with specific examples in wireless monitoring for neonatal intensive care and capture, storage and biomarker analysis of sweat, and Richard Price, demonstrating the potential for innovations with low-cost, smart and flexible electronic objects. The topics of the invited talks are 'Sustainable sensor solutions through printed and hybrid manufacturing' by Maria Smolander, 'Inkjettable, polydimethylsiloxane based soft electronic' by Matti Mäntysalo, 'Emerging sustainable sensors based on nanostructures on flexible and disposable substrates' by Magnus Willander, 'Ultra-low power on skin ECG using RFID communication' by John Batchelor, 'Variation-tolerant digital circuit design for printed/flexible electronics' by Joseph Chang, 'Advancing the sense of touch for collaborative robots' by Kaspar Althoefer, and 'TFT-based IP cores for flexible electronic applications' by Kris Myny.

Further, besides the contributed lectures and posters, the programme offers six 90-minute tutorial presentations, dealing with component integration and product design for printable electronics, a pathway to ubiquitous electronic sensing using printed electronics from nanomaterials, current trends and outlook for wearable electronics and e-textile, materials and technologies for flexible and printed IoT sensors, materials, devices and applications for organic narrowband photodetectors, and technology, materials and selected applications for 3D printing.

SIGGRAPH 2020
The 47th International Conference & Exhibition on Computer Graphics & Interactive Techniques

https://s2020.siggraph.org/
17–28 August 2020

This year organised as a virtual two-week event, SIGGRAPH 2020 held by a special interest group of the Association for Computing Machinery (ACM) traditionally offers the rich programme aiming to present the most transformative advancements in the field. The participants can join workshops, beginner and expert courses, production sessions, panel discussions, presentations of emerging technologies and interactive projects as well as scientific contributions, Frontiers Talks highlighting problems where the ACM SIGGRAPH's expertise can help create solutions, the awards recognising exceptional achievements in computer graphics and interactive techniques, the ACM SIGGRAPH Student Research Competition, Educator's Forum, the Job Fair, and much more. Marco Tempest is announced as a keynote speaker with a virtual presentation combining mixed reality, storytelling, gestural sensing and swarm robotics.

XVI Color Conference

https://gruppodelcolore.org
3–4 September 2020

XVI COLOR CONFERENCE
September 3rd-4th 2020

In 2020, the conference is held as a virtual event with a significant reduction in the registration fees. The programme includes many contributions in English or Italian concerning a wide range of aspects of colour and light.

The topics are, for example, the Euclidean colour-difference formula for small to medium colour differences in the log-compressed OSA-UCS space, geometric models of colour perception, colorimetric and material analysis of surfaces, a novel hyperspectral imaging system, identification of natural dyes through fibre optic reflectance spectroscopy and hyperspectral imaging techniques, colours in marketing education, the contribution of black colour to visual rhetoric of packaging, a systematic bibliographic review into colour psychology, a test on colour discrimination in complex scenes towards a wider understanding of colour blindness, etc.

FMTX 2020
Future Manufacturing Technologies

https://www.fmtexpo.org/
16 September 2020

For its 2nd edition, the joint FMTX conference and expo had to be rescheduled and changed to an online event. The programme offers the plenary talks on digital transformation and sophisticated analytics enabled by connecting to all data sources to acquire real-time data, panel discussions on the challenges of creating the connected factory of the future and empowering the workforce of tomorrow, 3D Printing Live Stage with sessions on industrialisation, advanced materials, quality assurance and testing, and more.

FESPA Events

For September 2020, only one FESPA print and signage show is currently scheduled: the FESPA Africa exhibition taking place in Johannesburg, South Africa (9–11 September) and co-located with Sign Africa, Africa Print, Africa LED and the Modern Marketing Expo. The FESPA Brasil event held in São Paulo and normally organised a half year earlier was at first postponed to September but eventually its 2020 edition had to be cancelled.

Packaging Events by EasyFairs

The 18th edition of Empack is announced for 15–17 September 2020 in Utrecht, The Netherlands. The event dedicated to premium packaging, Packaging Innovations & Luxury Packaging, is held in London, UK one week later (23–24 September 2020).

20th International Coating Science and Technology Symposium

Minneapolis, Minnesota, USA
20–23 September 2020

The announced programme of this event features also the session focused on printing, with contributions dealing with hybrid manufacturing of high-resolution and high-performance metal conductors on plastic substrates and the study of pressure and shear stress distribution of drop impact, for example.

12th 3D Printing Days

Kielce, Poland
22–24 September 2020

This Polish exhibition for 3D printing also hosts manufacturers and distributors representing 3D scanning industry and rapid prototyping sector.

SPIE Optics & Photonics 2020

https://spie.org
24–28 August 2020

As each other SPIE Digital Forum, this one is also freely accessible via the SPIE Digital Library online platform that brings live plenary presentations and on-demand technical talks; it also enables collaboration with exhibiting companies and connecting with colleagues through online networking events. The plenary session on Organic Photonics + Electronics is scheduled for 25 August. It starts with a presentation on quantum dots by Changhee Lee, discussing especially the technical challenges and development opportunities of inkjet-printed QLED displays. The second lecture by Karl Leo reviews the key features of solid-state organic solar cells and recent progress in the field along with the remaining challenges hindering the achievement of broad commercial impact, discussing the main aspects important for mass production and possible application scenarios. The last presentation by Niyazi S. Sariciftci then stresses how important is to use environmentally friendly materials as the organic electronic devices are maturing from the academic research into the industrial development, presenting the advances in bio-organic materials. Furthermore, the lecture presents the bio-organic systems that utilise enzymes immobilised on graphene.

Across individual conferences, the contributions employing printing technology include the invited talks on printed transistors for ocean sensing and on the commercialisation of QLEDs with their inkjet printing manufacturing, as well as the papers dealing with 3D-printed computer-generated volume holograms, printable thermally activated delayed fluorescence polymer light-emitting diode, perovskite solar cells with all-inkjet-printed absorber and extraction layers, a novel transfer printing approach for solution-processable perovskite heterostructures, fully printed flexible perovskite photodetector arrays, formation of highly crystalline organic semiconductor thin films by inkjet printed thickness gradients, and more.

London Imaging Meeting 2020

http://www.imaging.org
30 September to 1 October 2020

This new topic-based conference in imaging science, being launched this year and originally scheduled for April, had to be postponed and transformed into the online format. The theme for 2020 is "Future Colour Imaging". The 90-minute pre-conference workshop on the first morning provides background on colour theory and discusses its relationship to the in-camera processing pipeline and imaging applications. The conference programme offers two keynote presentations – 'Surface color perception in realistic scenes: previews of a future color science' by Laurence Maloney and 'Designing cameras to detect the "invisible": towards domain-specific computational imaging' by Felix Heide. The sessions deal with the visibility, colour science and applications, perception, image reproduction and computer vision. The announced topics of the corresponding focal talks are focused on imaging the visible beyond RGB (Jon Hardeberg), the recent developments on colour science (Ronnier Luo), perception (Hannah Smithson), the challenges, solutions and applications for graphical 3D printing (Philipp Urban), and image quality assessment based on convolutional neural networks (Raimondo Schettini).

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2-2020

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