



innoLAE 2022

22 February 2022
Online

IMI EUROPE

Wet and Dry Processing Technologies For Large Area Electronics

innoLAE (Innovations in Large-Area Electronics) is pleased to again provide two short courses on fabrication and processing technologies on the day preceding the innoLAE 2022 conference.

Wet Processing Technologies for Large Area Electronics

The Wet Processing Short Course is delivered by Printed Electronics Ltd (PEL) and the Centre for Process Innovation (CPI). It covers the inks and printer technology required for deposition techniques including screen, inkjet and flexo/gravure printing. The short course also covers coating techniques such as doctor blade and slot die, drawdown, spin and spray coating. In each case the advantages, disadvantages and technological challenges of each technique will be covered, along with issues arising in scale up for manufacture.

Dry Processing Technologies for Large Area Electronics

The Dry Processing Short Course is delivered by the Centre for Process Innovation (CPI). It covers the key processing techniques required for large area electronic device manufacture, including vacuum deposition, photolithography, laser ablation and wet and dry etching. In each case the advantages, disadvantages and technological challenges of each technique will be covered, along with issues arising in scale up for manufacture.

Dry Processing Technologies for Large Area Electronics

Tuesday 22 February 2022

08:50 – 09:00 Registration
09:00 Course begins

Dry Processing (Thin Film Fabrication and Patterning) - CPI

Vacuum Deposition - CPI

- Physical vapour deposition
- Chemical vapour deposition
- Description of evaporation process
- Description of sputtering process
- Comparison of evaporation vs sputtering
- PVD chamber design
 - Requirements for a process chamber
 - Discussion on vacuum pumps types
 - Discussion on power supplies
- PVD process conditions
 - Pressure, time & power vs deposition rate & thickness
 - Magnetron sputtering
 - Metal vs reactive sputtering
 - Target types
- Description of ALD process
 - ALD cycle
 - Temporal vs spatial ALD
 - Current tool types

Photolithography Processes - CPI

- Photo processes
 - Positive and negative resists
 - Lift off resists
 - Image reversal resists
 - Cured dielectrics
 - Hard mask process
 - UV-NIL

Photolithography Processes - Continued

- Photo tool set
 - Spin Coating
 - Alignment
 - Maskless photolithography
 - Developing photoresist
- Common issue considerations
 - Resist adhesion
 - Reflectivity of the material or underlying material
 - The planarity of the material
 - Etch characteristics of the material
 - Resist removal method
 - Thermal stability of sublayers and deposited material
 - Exposure factors

14:50 - 15:20 Coffee break

Laser Processing for Ablation and Patterning

Etching Processes - CPI

- Differences between wet and dry etching
- Isotropic versus anisotropic
- Typical wet etch chemistries
- Typical wet etch problems
- Plasma etch fundamentals
- Selectivity, etch rate, uniformity
- Steps in a plasma etch process
- Typical plasma chemistries

Integration - CPI

- Brief overview of the CPI integration facility
- Case studies

17:00 Course ends



Wet Processing Technologies for Large Area Electronics

Tuesday 22 February 2022

12:30 – 13:30 Registration
13:30 Course begins

Wet Processing (Formulation, Coating and Printing) - PEL and CPI

Materials and Formulation - CPI

- Inks
 - Silver, copper, carbon and other ink materials
- Formulation
 - Rheology
 - Solvent-based inks
 - Curable inks
 - Ink formulation components
 - Mixing and scale-up
- Substrates
 - Polymers, glass, paper, textiles and metals

Printing - Printed Electronics Limited (PEL)

- Inkjet
- Screen print
- Other print technologies such as flexography, gravure etc.

11:00 - 11:30 Coffee break

Large Area Coating Methods - CPI

- Batch coating
 - Drawdown and dip
 - Spin coating
- Continuous processes
 - Doctor blade
 - Spray coating
 - Slot die
 - Scale-up for continuous processes
- Applications of large area coating

12:30 Course ends

Speakers

Anna-Marie Stobo, Senior Research Scientist

CPI, UK

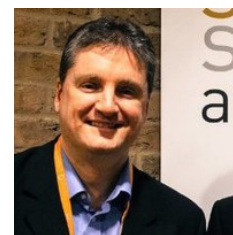
Anna has expertise in ink formulation, materials for additive manufacturing and advanced characterisation methods. Her role in several collaborative projects built capability in developing bespoke inks for industrially relevant print techniques through statistical design, a bottom-up approach to formulation and a safety driven approach to material selection. She has comprehensive capability in characterisation, particularly in microscopy and rheology, as well as an understanding of statistical methods to direct formulation development.



David Barwick, Technology Manager

CPI, UK

Dave is a technology manager and has worked at CPI since 2009. He has led projects focusing on the development of sensors, energy harvesting technology, internet of things applications, and solid-state lighting. Dave is a chartered scientist and a Fellow of the Royal Society of Chemistry with a PhD in surface science. He has particular expertise in printing and coating technologies, ink formulation and characterisation with application to sensors and other printed electronic devices.



Dr Neil Chilton, Technical Director

Printed Electronics Limited, UK

Neil has more than twenty years' experience in the field of electronics and electronic components. After completing his BSc and PhD in Physics, his technical career took him to Japan where he worked for four years at the advanced materials research division of Nippon Steel Corporation. After returning to the UK he joined Europe's then largest printed circuit board manufacturing company where he was later part of an MBO team and technical director. In 2006, together with co-founder Dr Steve Jones, he started Printed Electronics Limited to focus on the practical use of inkjet for manufacturing electronic interconnects, devices and systems.

