Simprint Nanotechnologies
Software product range and specifications

simprint
NANOTECHNOLOGIES

Last updated: May 2016

Simprint Nanotechnologies is expanding its product range in 2016 to meet the growing needs of its industrial and research customers. The following table summarises the features and capabilities of the product range as it now stands, and of modules that we intend to release during 2016.

Product range and capabilities

Capability	Simprint Core	Optional add-on modules			
		Droplet-dispense	Multi-scale droplets	Substrate topography	Roller imprint
Physical effects captured					
Imprinting of thermoplastic and UV-curing spun-on resist films	●				
Simulate residual layer thickness (RLT) as a function of position and time during the imprinting process	●				
Include the effect of capillary pressures acting within individual template cavities	●				
Simulate extent of stamp cavity filling as a function of time and position during imprinting	●				
Simulate elastic deflections of templates/stamps and substrates with up to two finite-thickness layers	●				
Simulate pneumatic or platen loading of template	●				
Imprinting of UV-curing resin dispensed as droplets		●			
Coarse-grain simulation of spreading and coalescence of $\gtrsim 10^4$ droplets beneath template: many droplets per “pixel” of the simulation		●			
Simulate spreading of individual droplets or clusters of a few droplets at the sub-droplet resolution		●			
Full simulation at the sub-droplet resolution of the spreading and coalescence of $\gtrsim 10^4$ droplets beneath an entire template.			●		
Simulate effect of non-flat (e.g. post-CMP) substrate				●	

Capability	Simprint Core	Optional add-on modules			
		Droplet-dispense	Multi-scale droplets	Substrate topography	Roller imprint
Simulate roll-to-roll and roll-to-plate imprinting with thermoplastic and UV-curing materials					●
Simulate contact area between roller and web during roller imprinting					●
Simulate resin “pile-up” behind a roller template					●
Simulate the viscoelastic behaviour of material in a thermoplastic web softened near its surface by a heated roller					●
Design data importing					
Import from GDS format using Simprint’s proprietary layout extractor	●				
Import the text-format output of running Mentor Graphics Calibre DFM commands (Calibre DFM licence required). Suitable for extremely complex GDS layouts.	●				
Create template representations directly using Matlab scripting (Matlab licence required)	●				
Specify up to two different cavity heights within a single template by using a GDS masking layer to define which region has which height	●				
Import droplet coordinate and volume definition text files (user can also force all droplets to a single specified volume in the interface)		●			
Process parameter inputs					
Template material(s) or elastic properties, and geometry (*i.e.* layer thickness(es) and cavity heights)	●				
Substrate material(s) or elastic properties, plus layer thicknesses for multi-layer substrates	●				
Imprinting load, duration, and temperature (temperature required for thermal imprint only)	●				
Contact angles between resin, template and substrate	●				
Initial template curvature and approach speed; template curvature relaxation time and load; post-relaxation/pre-curing load and dwell time		●			
Roller diameter(s) and feed rate					●

Capability	Simprint Core	Optional add-on modules			
		Droplet-dispense	Multi-scale droplets	Substrate topography	Roller imprint
Material property models					
Pre-installed rheological models for five common thermoplastic resist materials and a selection of commercial UV-NIL resists	●				
Ability to define custom resist models based on knowledge of viscosity and surface tension	●				
Interface					
Graphical user interface for setting up simulations and visualizing results as color maps and cross-sections	●				
Export simulation results as image files, videos and CSV (text) files	●				
Scripting syntax to enable automation of simulations	●				
Available when?	Now	Now	Now	Summer 2016	Late 2016
Prerequisite products to run	–	Core	Core, Droplet-dispense	Core	Core
Current version	v4.1	v1.1	v1.1		

System prerequisites to run all Simprint software:

- A computer running either Microsoft Windows 7 or later, or Linux.
- The computer requires 4 GB RAM or preferably 8 GB or more.
- Java Runtime Environment installed (most computers will already have this).
- Matlab Compiler Runtime installed (available as a free download from mathworks.com)
- A monitor that is at least 1280 pixels wide and 800 pixels tall.
- At least 1 GB free hard disk space.

Performance example

- Typical spatial resolution: 100 microns for a full 24 × 36 mm imprinted field; ~ 5 minute simulation time on desktop computer (measured with Intel Core i7 processor and 8 GB RAM)

Delivery and installation

- Software and documentation is delivered electronically via the Internet with a secure download link.
- A CD-ROM version with printed documentation is available upon request.
- All software/module(s) purchased are shipped within a single executable file. Three versions of the file are supplied: one for 64-bit Windows, one for 32-bit Windows, and one for Linux (64-bit). No source code is shipped with the software.
- The GDS layout extractor is shipped as a separate executable utility. Again, no source code is supplied.
- A customised licence file is required for each computer on which the software will be operated. The MAC address of the desired computer will need to be communicated to Simprint in order to produce the licence file.
- If the customer later elects to move a licence to another computer, Simprint will provide a new licence file for a new MAC address upon request, providing that the customer undertakes to use only the licenced number of computers at any one time.

Key licence terms

- Licence terms are tailored to the needs of individual customers. Please contact Simprint or their agents to discuss your requirements.

Support and maintenance

The initial purchase of a software licence for a particular product comes with one year's functionality and support. To help you start using the software, we provide the following:

- Full documentation in electronic format, including a step-by-step installation and user manual, worked examples, and associated data files describing stamp designs and process parameters. The documentation describes in detail the physical basis of the simulation techniques used by Simprint Core.
- Support by e-mail, web, and telephone.
- Any software upgrades are available free of charge for one year from the start of the licence term.
- As part of the support package, Simprint Nanotechnologies can work with you to build simulations from scratch, starting with GDS-format design files and ending with predictions of residual layer thickness, stamp–resist contact pressure, and stamp-cavity filling, as appropriate.

After the first year of use, continued functionality, additional support and upgraded versions of the software can be purchased for a further maintenance fee. Maintenance includes:

- Continued use of the software (the software will cease to function if not maintained)
- Access to any updates released for maintained products during the maintenance period
- Continued technical support by e-mail, web and phone