

# Lithography simulation workshop

## Content

### The workshop will provide an excellent opportunity to discuss

- the results of the latest research activities and future developments in lithography and lithography simulation
- strong and weak points of present simulation models and necessary model extensions
- various topics from different points of view, as the participants have different backgrounds (modeling, tool & material suppliers, and semiconductor manufacturing)

### Focal topics of the 2006 workshop are:

- **Alternative lithographies**  
Simulation of lithographic processes besides from standard projection printing (proximity and near field lithography, nanoimprint, direct e-beam or laser writing, ...)
- **Optimization and its application**  
Optimization methods and their applications in lithography simulation
- **Extensions of electromagnetic field simulation (EMF)**  
Extensions of 3D electromagnetic field simulations of light diffraction from lithographic masks (material properties, impact of evanescent waves, surface plasmons,...)

In order to have a fruitful exchange of ideas, the number of participants is limited to 35.

## Workshop accommodations

The workshop takes place in Hersbruck at the Conference Hotel Lindenhof, which is located in a typical Franconian landscape.

This workshop is organized by  
Fraunhofer IISB

# Program

## Friday, September 29, 2006

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6:00 pm	Dinner
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7:00 pm	<b>Welcome and introduction</b> A. Erdmann (IISB)
7:45 pm	<b>Breaking the diffraction limit using plasmonics</b> O. Martin (EPFL, Lausanne)
8:30 pm	<b>Welcome reception</b>

## Saturday, September 30, 2006

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8:00 am	Breakfast
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9:00 am	<b>Theory and practice of polarized optical lithography: Implications for image simulation</b> M. Totzek, D. Krämer, O. Dittmann, A. Göhnermeier (Carl Zeiss)
9:30 am	<b>Fast optical and EUV mask near field simulation using the waveguide method</b> P. Evanschitzky (IISB)

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10:00 am	Coffee break
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10:30 am	<b>Convergence improvement for RCWA considering crossed gratings using normal vector fields</b> T. Schuster, N. Kerwien, S. Rafler, W. Osten (University of Stuttgart), J. Ruoff (Carl Zeiss)
11:00 am	<b>Sensitivity of lithography to scanner and reticle imperfections</b> P. De Bishop, V. Philipsen (IMEC), G. Citarella, A. Erdmann (IISB)
11:30 pm	<b>Discussion on EMF simulation</b>

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12:00 pm	Lunch
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1:30 pm	<b>Heuristic search methods: Optimization for real-world applications</b> G. Kokai (University of Erlangen / Nuremberg)
2:00 pm	<b>Optimization of lithographic process conditions by means of artificial evolution</b> T. Fühner (IISB)

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2:30 pm	Coffee break
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3:00 pm	<b>Simulation and optimization of optical nanostructures</b> Ch. Hafner (ETH Zurich)
3:30 pm	<b>Inverse lithographic imaging of two dimensional gratings</b> R. Köhle, B. Kuchler, C. Nölscher (Qimonda)
4:00 pm	<b>ARC and swing optimization for high-NA photolithography</b> J. Bauer, U. Haak (IHP Frankfurt)
4:30 pm	<b>Discussion on optimization</b>

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5:00 pm	Special event and dinner
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## Sunday, October 1, 2006

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8:00 am	Breakfast
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9:00 am	<b>Numerical simulations of electrostatic discharge effects on photomasks</b> S. Boschert (Siemens)
9:30 am	<b>Writing and exposure optimization in maskless direct e-beam lithography</b> P. Hudek (FH Vorarlberg)
10:00 am	<b>Certain simulation and predictive and analytical computational methods used in DUV-laser direct-writing of semiconductor photomasks</b> H. Fosshaug, M. Ekberg, P. Askebjerg, L. Ivansen, J. Hellgren (Micronic Laser Systems)

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10:30 am	Coffee break
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11:00 am	<b>Mask proximity printing</b> B. Meliorisz (IISB)
11:30 am	<b>Wafer-scale simulation of nanoimprint</b> V. V. Sirotkin, A. A. Svintsov, S. I. Zaitsev (IMT RAS)
12:00 pm	<b>Discussion and summary</b>

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1:00 pm	Lunch
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2:00 pm	<b>Departure</b>
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## Fax registration

to  
Fraunhofer Institute of Integrated Systems and Device  
Technology

**fax +49 (0) 9131 / 761- 212**

- ☒ I will participate
- ☒ I will arrive by train in Hersbruck at \_\_\_\_\_

**Deadline for registration** September 8, 2006

**Participation fee** 475,- €  
The fee covers board, lodging and the evening program. You will receive a confirmation of registration. We will invoice you for the fee.

**Cancellation** In case of cancellations after the expiration of the deadline you will be charged 75% of the fee. Standing in for a registered participant is possible.

## Sender

Title, First-Name, Name

Company / Institution

Street

City

Phone, Fax

E-mail

Date, Signature

Use one form per person please.

## Organizational information

**Address of the institute** Fraunhofer Institute of Integrated Systems and Device Technology  
Schottkystrasse 10  
91058 Erlangen, Germany

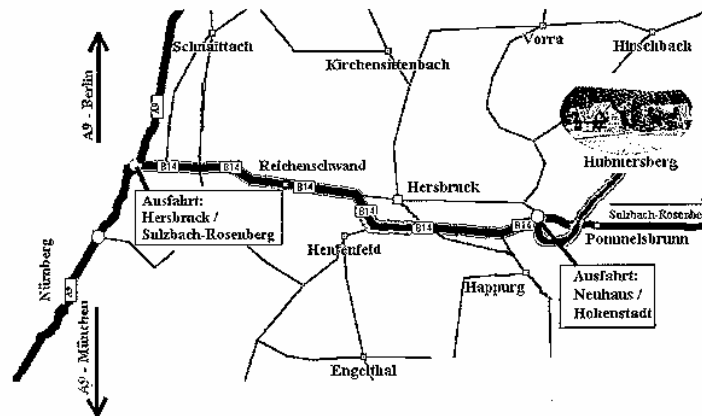
**Organization of the workshop** Andreas Erdmann  
phone +49 (0) 9131 / 761-258  
fax +49 (0) 9131 / 761-212  
lithography@iisb.fraunhofer.de

**Contact** Bernd Tollkühn  
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lithography@iisb.fraunhofer.de

**Hotel** Hotel Lindenhof  
Ringhotel Hersbruck  
Hubmersberg 2  
91224 Pommelsbrunn

### Directions – arrival by car

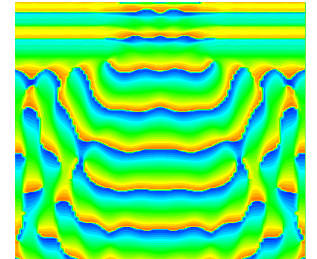
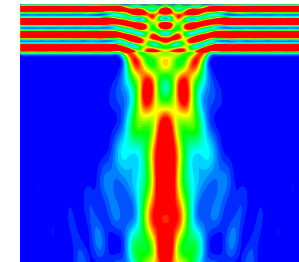
- § follow highway A9 (Munich – Nuremberg – Berlin), take exit *Hersbruck/Sulzbach-Rosenberg*,
- § pass Hersbruck, follow the B14 to exit *Neuhaus-Hohenstadt*
- § after 3 km take the second road on the right



Please contact us if you arrive by air or train. We will send you further information.

# Lithography Simulation

## 4<sup>th</sup> IISB Lithography Simulation Workshop



September 29 – October 01,  
2006

in Hersbruck, Germany



**Fraunhofer** Institut  
Integrierte Systeme und  
Bauelementetechnologie