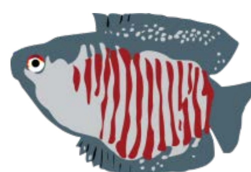

ICT Project no. 619793

CoLiSA.MMP

Computational Lithography for Directed Self-Assembly: Materials, Models and Processes

D1.1: Project Presentation
Involved partners: Fraunhofer IISB

	Name	Organisation	Date
Edited	Andreas Erdmann	Fraunhofer IISB	November 14, 2013
Final approval	PMC members		November 29, 2013

National
Technical
University of
Athens

GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

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Contract Number

619793

Project acronym

CoLiSA.MMP

Project name

Computational Lithography for Directed Self-Assembly: Materials, Models and Processes

Research area

Nanoelectronics

List of participants

Participant	Country
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. (IISB)	Germany
Arkema France SA (Arkema)	France
Agencia Estadal Consejo Superior de Investigaciones Científicas (CSIC)	Spain
Universite de Bordeaux 1 (LCPO)	France
Commissariat à l'Energie Atomique et aux Energies Alternatives (LETI)	France
National Technical University of Athens (NTUA)	Greece
Georg-August-Universität, Göttingen, Stiftung Öffentlichen Rechts (UGOE)	Germany

Project Summary

Directed self-assembly (DSA) of block copolymers is one of the most promising techniques to enable the continued miniaturization of ICs and to **boost the performance in More Moore**. It combines top-down photolithography for creation of guiding patterns with engineered **new materials and processes** to facilitate cost effective bottom-up techniques for pattern density multiplication and defect rectification. An industry scale application of DSA still faces two challenges: i) The host substrate heavily impacts DSA. The resulting pattern formation must be well understood and modeled in order to optimize its efficiency and avoid defects. ii) The specific properties of DSA must be considered early in the design process.

CoLiSA.MMP will develop **new material and process models** and a computational lithography framework for DSA. Existing and new, specially designed atomistic and coarse-grained models will be combined with experimental data to develop and calibrate efficient predictive reduced models, seamlessly integrated in lithographic process simulation. The new modeling capabilities will be used to establish **new design** flows which include the

lithographic generation of guiding patterns and the resulting patterns after DSA. Inversion of the problem will predict lithographically manufacturable guiding patterns and process conditions for given target structures. The extended capabilities of computational lithography will be also used to improve materials and processes which are still under development, to study the root causes of DSA specific defects and to propose strategies to avoid or reduce them.

CoLiSA.MMP combines European expertise in soft matter physics, block copolymer chemistry, lithographic process and computational lithography. This will help to bridge the gap between the multifaceted research activities on DSA and the integration of DSA in future processes and design flows for **More Moore IC manufacturing** and for **new functionality in More than Moore**.

Total Costs

€ 4,913,877.00

Commission funding

€ 3,546,000.00

Project start and duration

November 1, 2013 to October 31, 2016 – 36 months

Project web site

http://www.colisa.eu

Coordinator contact details

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