

Nanowire-based One-Dimensional Electronics (NODE)

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The integrated project “NODE” is developing and evaluating technologies for growth and processing of semiconductor nanowire devices for their possible impact as key add-on technologies to standard semiconductor fabrication. The partners in NODE work on generating a deepened understanding of the physics phenomena of one-dimensional semiconductor materials and nanowire-based devices, and on developing new functionalities not found in traditional higher-dimensional device structures.

A set of key device families based on semiconductor nanowires are studied in detail; such as tunneling devices, field-effect transistors, and bipolar transistors. Also unique opportunities that may be offered by nanowires in different areas are explored, e.g. memory applications, high-temperature transistors and on-chip-realization of optical devices. NODE is making a dedicated effort to evaluate the potential for integration of nanowire-specific processing methods and to assess the compatibility with requirements from conventional semiconductor processing, as well as evaluating novel architectural device concepts and their implementation scenarios.

Participants

Lunds universitet

Philips Electronics Nederland B.V.

Technische Universiteit Delft

Max Planck Gesellschaft zur Foerderung der Wissenschaften

Bayerische Julius – Maximilians Universität Würzburg

Scuola Normale Superiore

IBM Research GmbH

Interuniversitair Micro-Elektronica Centrum vzw

Qumat Technologies AB

Qimonda Dresden GmbH & Co. OHG

Commissariat à l’Energie Atomique

NXP Semiconductors Belgium NV

Country

Sweden

Netherlands

Netherlands

Germany

Germany

Italy

Switzerland

Belgium

Sweden

Germany

France

Belgium

Expected end results

At the end of the project, a selection of the most promising nanowire technologies will have been made and the incorporation of nanowire devices into Si-technology demonstrated. More specifically the expected end results are:

- electronic devices based on semiconductor nanowires have been built and evaluated:
 - NW-based transistors with increased frequency response and decreased power consumption
 - Nanowire logic elements
 - Nanowire-based memory structures
- nanowire growth and related nanostructuring have been assessed in terms of up-scalability and Si-integration potential
- The potential for novel device designs using nanowires has been explored

