



SOI & ADVANCED SUBSTRATES NEWS
ACCELERATING INDUSTRY GROWTH | Bi-Weekly Newsletter

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FEATURED IN THIS EDITION

MICROHEATER HOTSPOT
ENGINEERING FOR SPATIALLY
RESOLVED AND REPEATABLE
MULTI-LEVEL SWITCHING IN
FOUNDRY-PROCESSED PHASE
CHANGE SILICON PHOTONICS

This study demonstrates waveguide-integrated microheaters for deterministic phase change material switching, enabling 7 repeatable multi-level states with 27 cycles on an SOI platform. This work overcomes the scalability-precision trade-off in photonic circuits by engineering localized hotspots, advancing robust, energy-efficient phase change photonics for analog computing.

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ENGINEERING DOWNWARD-
PROPAGATING THREADING
DISLOCATIONS FOR INP LASERS
LATERALLY GROWN ON 220 NM SOI

This study presents a paradigm-shifting approach for III-V laser integration on 220nm SOI by engineering downward-propagating threading dislocations, enabling defect-free InP membranes. The resulting monolithically integrated nanodisk lasers demonstrate single-mode operation with an ultra-low threshold of 65.8 $\mu\text{J}/\text{cm}^2$, enabling scalable III-V/Si photonic integration.

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GLOBALWAFERS TO OPEN U.S.'
FIRST 12-INCH SILICON WAFER FAB
SOON

The new Texas plant is expected to start to contribute sales to GlobalWafers in the second half of the year with 12-inch silicon-on-insulator (SOI) wafers, which will be used in the defense and aerospace industries, GlobalWafers said.

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MONOLITHICALLY INTEGRATED
ASYNCHRONOUS OPTICAL
RECURRENT ACCELERATOR

This study demonstrates a monolithic SOI-based optical computing chip that uses wavelength-encoded asynchronous processing to eliminate synchronization bottlenecks in recurrent AI tasks, achieving 1.8 ns latency and 0.48 TOPs/J efficiency.

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SOI ECOSYSTEM NEWS

IMEC AND TNO LAUNCH HOLST
CENTRE PHOTONICS LAB

By advancing photonics research and fostering collaboration between industry and academia, the lab aims to bridge the gap between innovation and industrialization for applications in sectors such as automotive, healthcare, and data communications.

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INFINEON AND VISTEON
COLLABORATE ON ADVANCED
POWER CONVERSION SYSTEMS FOR
NEXT-GENERATION EVS

Infineon and Visteon will collaborate and integrate power conversion devices based on Infineon semiconductors, with particular emphasis on wideband gap device technologies, which provide significant advantages in power conversion applications compared to silicon-based semiconductors.

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SV-SAW RF FILTERS BASED ON
LOW-COST 128°Y LINBO3/SIO2/POLY-
SI/SI SUBSTRATE FOR 6G CMWAVE
WIRELESS COMMUNICATIONS

Addressing the need for low-cost filter solutions for higher frequencies, this study presents a silicon-substrate-based surface acoustic wave (SAW) technology platform to enable high-performance resonators and filters for 6G X-band (7–12 GHz) centimeter-wave (cmWave) wireless communications.

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IN SITU SIN/ALN/GAN HEMTS WITH
REGROWN CONTACTS USING
SELECTIVE ETCHING

Engineers from Ohio State University claim to have opened the door to the fabrication of far smaller AlN/GaN HEMTs operating at much higher frequencies. The team's breakthrough involves the combination of in-situ passivation and the addition of regrown heavily doped n-type contacts using a selective etching process.

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COMPOUND SEMICONDUCTOR

UK TO OPEN CENTRE FOR BRAIN-
INSPIRED, ENERGY-EFFICIENT
COMPUTING

UK launches £5.6M neuromorphic computing centre to pioneer brain-inspired, energy-efficient technologies. Led by Aston University with partners including Oxford, Cambridge and industry giants like Microsoft, the initiative will merge neuroscience with photonics and AI to develop ultra-low-power computing systems.

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BYD TO OPEN R&D CENTRE IN
HUNGARY

The R&D centre will start with two specific projects, supported by significant investment. The first project will focus on the further integration of intelligence into vehicle designs, while the second will help to develop advanced next-generation electrification technologies.

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OPTIMAL SELECTION AND
EXPERIMENTAL VERIFICATION OF
WIDE-BANDGAP SEMICONDUCTOR
FOR BETAVOLTAIC BATTERY

Wide-bandgap semiconductor betavoltaic batteries show promise for micro-power systems, but material selection remains debated. While SiC batteries demonstrate higher efficiency than GaN or diamond despite a smaller bandgap, this study analyzes energy deposition, electron-hole pair generation, and collection efficiency to explain the anomaly.

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QUARTZ-FREE HYDRIDE VAPOR
PHASE EPITAXY FOR PRODUCTION
OF LARGE SIZE GAN-ON-GAN
EPITAXIAL WAFERS

GaN-on-GaN epitaxial growth on 4 and 6-inch wafers was demonstrated using a new mass-production-type quartz-free hydride vapor phase epitaxy (QF-HVPE) system. The thickness, effective donor density, and near-band-edge photoluminescence peak intensity were confirmed to be uniform for 4-inch wafers.

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SEMI BLOG

ENERGY-EFFICIENT COMPUTING
SYSTEMS FOR SUSTAINABLE AI

As artificial intelligence (AI) proliferates rapidly, AI models and datasets are also growing rapidly in size. This growth far outpaces performance improvement in hardware systems and is increasing AI's energy consumption unsustainably. To address these challenges and explore collaborative solutions, SEMI's Smart Data-AI Initiative recently hosted a day-long workshop on Sustainable AI Systems that brought together domain experts from the entire AI ecosystem.

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SEMI NEWS HIGHLIGHT

SEMI NORTH AMERICA ADVISORY
BOARD WELCOMES NEW MEMBER
FROM SACHEM, INC.

SEMI has elected Rosemary Steen Hoffman, CEO of high-purity chemistry supplier SACHEM, Inc., to its North America Advisory Board (NAAB). Effective April 2025, her three-year term will focus on advancing member interests and addressing supply chain challenges in electronics manufacturing.

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