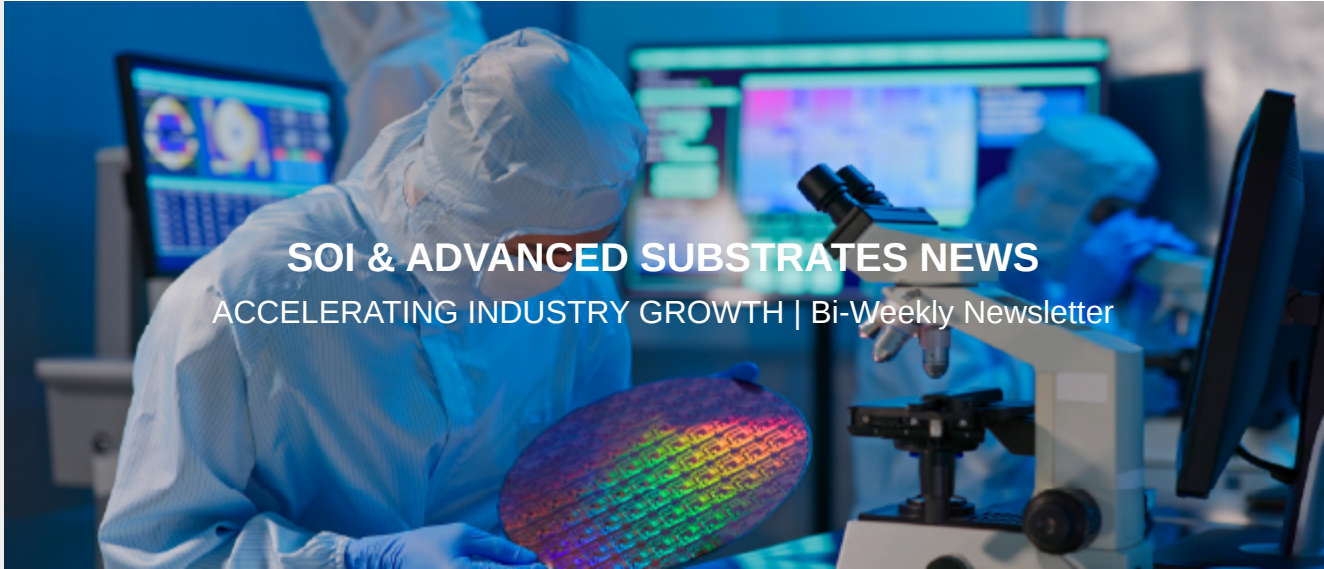




## SOI & ADVANCED SUBSTRATES NEWS

ACCELERATING INDUSTRY GROWTH | Bi-Weekly Newsletter

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### FEATURED IN THIS EDITION

#### BROADCOM WI-FI 7 FRONT-END MODULES GO MONOLITHIC ON RFSOI

Tower Semiconductor has started producing Wi-Fi 7 RF front-end modules (FEM) for Broadcom Inc. monolithically using its latest **RFSOI** manufacturing process. The high-resistivity SOI substrate also enhances PA efficiency by supporting passive elements such as inductors with a higher quality factor.

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#### DESIGN OF A MONOLITHIC SILICON-ON-INSULATOR RESONATOR SPIKING NEURON

In this recent study, researchers introduced a photonic foundry-compatible, light-based **silicon-on-insulator** excitable neuron, and discussed how technological advancements inform and guide its design. Unlike prior photonic SNN designs, the proposed model does not require the use of any transistors, resonant tunneling photodiodes, 2D or exotic materials, or lasers.

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#### COMPACT INVERSELY-DESIGNED VERTICAL COUPLER WITH BOTTOM REFLECTOR FOR SUB-DECIBEL FIBER-TO-CHIP COUPLING ON SILICON-ON-INSULATOR PLATFORM

Inverse design via topology optimization has led to innovations in integrated photonics. In this work, researchers applied topology optimization to design a compact vertical coupler incorporating a bottom reflector, which achieves sub-decibel coupling efficiency on the 220-nm **silicon-on-insulator** platform.

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#### FLEXIBLE SUPERCONDUCTING WIRING FOR INTEGRATION WITH LOW-TEMPERATURE DETECTOR AND READOUT FABRICATION

This study introduces a method of creating high-density superconducting flexible wiring on flexible thin silicon substrates. The flexible wiring is created by depositing superconducting wiring on a silicon-on-insulator (**SOI**) wafer, selectively etching away the thicker silicon section handle layer, and bending the thinner silicon device layer.

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### SOI ECOSYSTEM NEWS

#### GLOBALFOUNDRIES AND SILICON CATALYST PARTNER TO ACCELERATE DIFFERENTIATED TECHNOLOGY SOLUTIONS FOR SEMICONDUCTOR STARTUPS

The partnership will provide innovative startups with access to GF's differentiated platforms to speed the development and commercialization of next generation IoT, automotive and generative AI applications while anticipating future growth markets such as medical and quantum compute.

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#### SOITEC KICKS OFF EUROPEAN PROJECT TO DEVELOP FUTURE HIGH-FREQUENCY SEMICONDUCTORS

A European research and industry consortium led by Soitec has begun work to develop a future generation of high-frequency semiconductors based on Indium Phosphide (InP). The three-year project is a recipient of European Union funding as well as top-up financing from the governments of France, Switzerland, Germany, Sweden, the Netherlands and Belgium.

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#### EDGE TREATMENT FOR SPURIOUS MODE SUPPRESSION IN THIN-FILM LITHIUM NIOBATE RESONATORS

Thin-film lithium niobate is an attractive material for RF acoustic devices due to its high electromechanical coupling. This study presents a new method of spurious mode suppression through a special edge treatment etch process. It was found that the edge-treated resonators show a weaker spurious mode response.

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#### MECHANICAL PROPERTIES OF SILICON NITRIDE IN DIFFERENT MORPHOLOGIES: IN SITU EXPERIMENTAL ANALYSIS OF BULK AND WHISKER STRUCTURES

Silicon nitride (Si<sub>3</sub>N<sub>4</sub>) is widely used in structural ceramics and advanced manufacturing due to its excellent mechanical properties and high-temperature stability. This study investigated the mechanical properties of bulk Si<sub>3</sub>N<sub>4</sub> and Si<sub>3</sub>N<sub>4</sub> whiskers using in situ SEM indentation and uniaxial tensile strategies.

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### COMPOUND SEMICONDUCTOR

#### INFINEON SHOWS ITS FIRST 300M GAN WAFER

The 300mm GaN wafer was developed on an integrated pilot line in existing 300 mm silicon production in the Infineon power fab in Villach, Austria, using its 300mm silicon and 200mm GaN process technologies.

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#### BORGWARNER DEPLOYS STMICROELECTRONICS SILICON-CARBIDE TECHNOLOGY FOR VOLVO EVS

Volvo's next-generation EVs will rely on silicon carbide (SiC) power modules from BorgWarner to boost their efficiency and charging speed. The BorgWarner Viper power modules will incorporate third-generation 750-volt silicon carbide power MOSFETs from STMicroelectronics.

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#### INDIRECT-TO-DIRECT BANDGAP TRANSITION IN GAP SEMICONDUCTORS THROUGH QUANTUM SHELL FORMATION ON ZNS NANOCRYSTALS

Researchers designed and synthesized a zinc sulfide (ZnS)/Gallium phosphide (GaP) quantum shell based on the unique energy structure known as the reverse-type I, leading to the successful transformation of the indirect bandgap GaP into a direct bandgap material with substantially improved optical performance.

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#### PHYSICAL PROPERTIES OF AN EFFICIENT MAPBBR3/GAAS HYBRID HETEROSTRUCTURE FOR VISIBLE/NEAR-INFRARED DETECTORS

For the first time, a hybrid heterojunction photodetector based on methylammonium lead bromide (MAPbBr<sub>3</sub>) polycrystalline film deposited on gallium arsenide (GaAs) was presented, along with comprehensive morphological, structural, optical, and photoelectrical investigations.

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### SEMI BLOG

#### SMART MANUFACTURING, SMART DATA-AI, AND FUTURE OF COMPUTING: TECHNOLOGY COMMUNITIES MAKE CRITICAL LINKAGES ON INTEGRATING AI

Use of machine learning and artificial intelligence (ML/AI) is on an exponential rise across fields<sup>1</sup> including all aspects of the semiconductor industry. In the last decade, the use of ML/AI exploded in the areas of speech recognition, facial recognition, smart phone features, search engines and now large language models like ChatGPT, Bard AI, and CoPilot. The ML/AI growth has been enabled by massive data storage capacity and increased compute performance, leading to projections for the semiconductor industry to reach over \$1 trillion in annual revenue by 2030, with about 50% of the industry's growth related to GenAI.

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### SEMI NEWS HIGHLIGHT

#### HON'BLE PM NARENDRA MODI INAUGURATES SEMICON® INDIA 2024, SIGNALLING INDIA'S RISE AS A GLOBAL SEMICONDUCTOR HUB

As part of its ongoing efforts to accelerate India's semiconductor growth, SEMI has officially launched its Workforce Development Program in India with a recent workshop on Semiconductor Manufacturing, held in partnership with ESSCI at IIT Delhi. SEMICON India features additional SEMI programs to advance industry growth, such as Sustainability and Smart Manufacturing, supporting the favorable regulatory policies by the ISM and the Government of India and facilitating global investments to strengthen India's position in the industry.

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### EVENTS



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