Celebrating 90 years

Research milestones from SIMIT

1928
2018
SIMIT

Old campus, built in 1933

In the early 20th century, China's modern intellectual elites formed the "New Culture Movement" and began incorporating a Western-style research paradigm. In June 1928, under the leadership of famed educator Cai Yuanpei, they assembled in Shanghai and together founded the Academia Sinica. The Shanghai Institute of Microsystem and Information Technology (SIMIT), at the Chinese Academy of Sciences (CAS), was one of the first engineering research institutes of Academia Sinica and was also founded that same year.

Over the past 90 years, the institute has consistently followed the same principle: to better apply S&T in order to meet national strategic priorities and economic growth demands. Over the last 20 years, its research philosophy has shifted from pure scientific research to more applied, mission-oriented research. By combining the objectives and interests of the institute with the broader needs of Chinese society, SIMIT is devoted to driving China's technology innovation and adding to its rich tradition and heritage.

Research at SIMIT

SIMIT has three national-level key laboratories (the State Key Laboratory of Transducer Technology, the State Key Laboratory of Functional Materials for Informatics, and the National Key Laboratory of Microsystem Technology) and two CAS key laboratories (the CAS Key Laboratory of Wireless Sensor Networks and Communications, and the CAS Key Laboratory of Terahertz Solid-State Technology). Moreover, it includes the Center for Excellence in Superconducting Electronics (CENSE), a CAS-affiliated center aiming to be a global competitor in superconductor technology.

The mission of scientific research at SIMIT is to carry out strategic, innovative, and forward-looking studies, promote breakthroughs in key technologies and integrated innovation, provide systematic solutions, and consequently contribute to the development of information technology, advanced materials, and micro-/nanotechnologies. SIMIT fully exploits its advantages in two disciplines—electronics science and technology, and information and communications technology—to create a development strategy consisting of "three major breakthroughs and five top priorities."

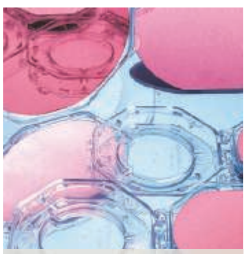
Three major breakthroughs

Intelligent sensing microsystems (ISMs)

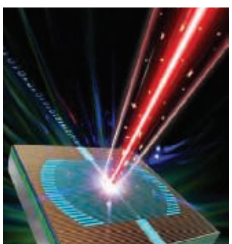
As China's pioneer in wireless sensor networks and the Internet of Things (IoT), SIMIT is devoted to providing comprehensive solutions for public security, smart city planning, and industry IoT. The institute boasts a wide range of competencies, from sensor development and equipment to telecommunications, data processing, networking, and much more, and uses many powerful tools, such as big data and artificial intelligence, to meet its research goals.

Superconducting quantum devices and circuits

SIMIT is devoted to fundamental scientific research on novel quantum materials, such as superconducting heterostructures, sensors, detectors, and digital circuits. It is focused on developing China's proprietary advanced superconducting core electronic devices, and producing integrated systems with superior performance advantages compared to conventional technologies.



Silicon-on-insulator (SOI) wafers



Superconducting nanowire single-photon detector

The forestry sensors and IoT

Advanced silicon-based materials and applications

SIMIT is devoted to the research, key technology development, and industrialization of 12-in. silicon wafers and engineered substrates, such as fully depleted silicon-on-insulators (SOI), radio frequency (RF) SOI, power SOI, microelectromechanical system (MEMS) SOI, radiation-hardened SOI, gallium nitride (GaN) on silicon, etc., for China's semiconductor and microelectronics industries. The institute is also working intensively on the development of electronic and optoelectronic circuits based on SOI materials.

Five top priorities

Special broadband wireless communication technologies and equipment

SIMIT gives priority to advanced broadband wireless communication technologies, such as concurrent transmission using orbital angular momentum and signal energy, for emergency management, high-speed railways, and smart power grids.

Micro- and nanotechnologies for sensors and transducers

SIMIT gives priority to research on state-of-the-art microelectromechanical-system/nanoelectromechanical-system (MEMS/NEMS) technologies for physical, chemical, biochemical, implantable, and combo sensors, as well as hyperspectrum detection microsystems.

Phase-change random-access memory (PCRAM) and applications

SIMIT gives priority to researching phase-change materials, engineering phase-change random-access memory (PCRAM) chips, and understanding the underlying mechanisms responsible for the low power, high speed, and high reliability of these products.

Terahertz (THz) solid-state technologies

SIMIT gives priority to research on THz quantum cascade lasers, quantum-well photodetectors, interactions between THz waves and various substances, millimeter-wave monolithic integrated circuits (ICs), and inspection imaging equipment with terahertz/millimeter waves.

Brain-inspired chips and bionic vision

SIMIT gives priority to R&D on brain-inspired chips and bionic vision systems, including binocular image signal processing (BISP) chips, sensors that mimic our five sense organs, and robotic limbs.