

PRINTED MICROELECTRONIC DEVICES

THE OPPORTUNITY

There is an increasing demand for microelectronic devices that are smaller, smarter, cheaper, more flexible, in-situ, and require less power.

Applications for these devices include sensors, communications, the Internet of Things, and energy storage technologies.

Printed microelectronic (PME) devices hold significant promise for being able to deliver these improvements. According to a recent report by Smithers Pira — a firm that conducts research on emerging markets, technologies and factors that affect the packaging, paper and print industries — the global market for PME is rapidly growing and projected to reach \$43 billion by 2020.

As a relatively new technology area, PME's come with challenges and considerations that are different from those of conventional, Si-based microelectronics. PME challenges/considerations include ink quality, printing resolution, and power integrity.

WHAT ARGONNE OFFERS

To meet the desire/need for PME that improve upon what is currently available, we need a platform that combines and enables novel materials from multiple disciplines, as well as co-designs systems, components, and integration processes.

The U.S. Department of Energy's Argonne National Laboratory is the leading materials laboratory in the country. From battery technologies to biosensors to quantum communication, Argonne has a long track record of unlocking the potential of new materials in devices.

Argonne's new PME program designs and prototypes novel and customized electronic devices, building on Argonne's expertise in microelectronics, materials science, nanotechnology, chemistry, data science, and more.

This program serves as a test bed for multi-line innovation around systems engineering, materials, processing/ packaging, and device testing — all of

which is open to both academic and industrial collaborators and customers.

In collaboration with Argonne's research divisions, the PME program offers expertise in key areas such as RF and 5G communication, sensors and edge computing, and battery and energy harvesting.

THE BENEFITS

PMEs offer multiple advantages:

- Low form factor and power consumption
- Low cost
- Conformal and embedded devices
- Stretchable and wearable
- Collaborative and/or autonomous

CONTACT

Argonne National Laboratory
9700 South Cass Avenue
Lemont, Illinois 60439
Phone: 630-252-2000
Email: partners@anl.gov
www.anl.gov