

# Platform technologies and core technologies

In order for Murata to continue to create new value, we need our technologies to evolve constantly. Murata, which has an integrated production structure encompassing materials to products, has developed technologies into platforms so that technologies forming the basis can be independently researched, developed, accumulated and applied in product development.

Murata has five platform technology domains, and each platform technology is comprised of several core technologies. Each core technology has been refined over a long period within Murata, and has become a source to differentiate us from competitors and create innovations.

## Platforms

<b>Materials technology</b>	 Materials design  Materials processing	<p>Materials technology is the technology to simulate and model material composition, crystal structures, and electrical properties, as well as to disperse and combine these materials while controlling ceramic particle sizes and crystal structures.</p>
<b>Front-end process technology</b>	 Laminating & stacking  Printing  Sintering  Nano & thin film fabrication  Surface finishing  Precision mechanical processing	<p>Front-end process technology includes, mainly, the technology to laminate and align crystal particles by forming them into dielectric sheets, technology to thinly and accurately form internal electrodes and wirings on ceramic sheets, and technology to form thin films on a submicron level using lithography and etching.</p>
<b>Product design technology</b>	 High frequency design  Device design  Embedded  High reliability design  Circuit design  Simulation	<p>Product design technology includes, mainly, the technology to design RF components and modules, to achieve high performance and small devices using software, etc., to achieve high reliability under harsh environmental conditions, and simulation to analyze electromagnetic fields, heat, and stress.</p>
<b>Back-end process technology</b>	 Packaging  Measurement  Automation  Industrial engineering	<p>Back-end process technology mainly includes the technology to achieve miniaturization and high reliability of devices through high-heat resistance connections and air-tight sealing, and technology to design equipment that transports extremely small products in different shapes at high speed and with low damage.</p>
<b>Analytical technology</b>	 Materials characterization  Failure analysis	<p>Analytical technology includes the technology to physically and electronically evaluate material compositions through non-destructive analysis, heat analysis, organic and inorganic analysis, and surface analysis, and technology to identify the cause of failures that occurred in materials and products through the abovementioned analytical methods.</p>

### Close Up!

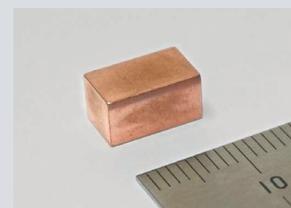
**Awarded the Prime Minister's Prize in the 49th Japan Industrial Technology Awards:**

**High-density, compact, oxide full solid-state battery with the industry's highest level of capacity (secondary battery)**

Murata has developed a solid-state battery with industry's highest level\* of energy capacity by integrating a process technology used in Murata's main products, such as multilayer ceramic capacitors and multilayer devices, and diverse materials technology amassed through the development of cutting-edge electronic components. The battery employs an oxide ceramic electrolyte instead of the electrolytic solution utilized in conventional batteries, making it noncombustible and strongly heat-resistant. The invention won the Prime Minister's Prize, the highest award, in the 49th Japan Industrial Technology Awards in recognition of its creativity and innovativeness.

The product, which packs high energy density in a compact size and achieves high performance in harsh

environmental conditions, is expected to contribute to reducing sizes and improving reliability of wearable devices, which has been difficult to achieve. As the battery excels in safety and durability performance compared to conventional lithium-ion batteries, it is expected to find uses in hearable devices, including wireless earphones, which require high safety standards and are used over a long time, and address wide-ranging needs in the expanding IoT society, helping to create an improving society.



\*As of August 2020, according to our own research