Q: What benefits do solid state batteries have over existing lithium ion batteries?

A: The major benefits of solid state batteries derive from the solid electrolyte. Conventional lithium Ion batteries use an organic solvent which is flammable and has a relatively short useful life.

Performance benefits include:

- Faster charging (6x faster)
- Increased energy density (2x energy for the same volume)
- Increased cycle life (up to 10 years, compared to 2)
- Low leakage currents (nano Amps)
- Non flammability

Q: Is the battery voltage similar to current lithium ion batteries?

A: The output voltage for the Stereax™ M250 is 3.5V.

Q: what applications could the batteries be used in?

The size and performance of the Stereax™ M250 solid state battery make it ideal for applications in autonomous sensor devices in the Internet of Things. Its low self-discharge allows it to be trickle-charged by an energy harvesting source such as vibration or a PV panel. Its high peak current enables the transmission of data using protocols such as Bluetooth Low Energy. The combination of energy harvester, transmitter, sensor and the M250 is ideal for integration into small, “fit and forget” autonomous sensor devices with multiple applications including, Smart Homes (HVAC, light, security), Automotive (infotainment, sensors), logistics (asset tracking) and medical devices (Biometric monitoring)

Q: Can the battery power real devices?

Ilika has demonstrated the ability of its Stereax™ M250 solid state battery to power a real device within the Internet of Things. This device is a Perpetual Beacon for Smart Homes, in other words, an autonomous sensing device of minimal size which, fixed on a wall, measures temperature data at regular interval and transmit the data using Bluetooth Low Energy to an app. The app displays temperature information as well as the battery’s state of charge and indicates if heating needs to be started or stopped. This device replicates sensors for Smart Homes, where the data could also be sent to a hub for automated control, but is so small as being easily forgotten.

Q: What materials are used in the batteries?

A: The Stereax™ M250 batteries use similar cathodes to current lithium batteries but we use different materials for the electrolyte and anode. The anode in the Stereax™ M250 is silicon.

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Q: What is the operating temperature range of the batteries?

A: The Stereax^{TM} M250 can work between -20DegC and 100DegC

Q: Are solid state batteries limited to the same cylindrical (prismatic) format as conventional batteries such as AA or AAA format?

A: Solid state batteries are flat and our Stereax^{TM} M250 batteries have a square footprint. The footprint can be adapted to suit the end device requirements.

Q: How thin can a solid state battery be?

A: The thickness is dependent on the thickness of the substrate. For the Stereax^{TM} M250 battery, we use a standard 650 μm silicon substrate, and the overall thickness of the battery is less than 750 μm thick. Tests are on-going to use other substrates such as 200 μm glass.

Q: What is the scalability of the technology?

A: Ilika's batteries can be scaled to larger footprints using production processes used to produce bulk glass and photo-voltaic sheets. This creates the potential for large area batteries.

Q: How does Ilika's solid state battery differ from other solid state batteries?

A: The main difference is the combination of materials. Other solid state batteries use "free lithium" which is highly reactive with moisture and air and hence require stringent encapsulation. In the Stereax^{TM} M250, the lithium is not free during storage or cycling; it is "alloyed" in the cathode or anode and this reduces the encapsulation requirements. The combination of material and synthesis method enable a 40% energy improvement per footprint and an increased operating temperature range.

Q: Does Ilika have patents protecting this new technology?

A: Ilika currently has 5 patents which cover three main areas: the composition of the materials in the battery, the process to make the battery and the cell architecture of the battery.

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