



News Release

March 2, 2023

Nippon Electric Glass Co., Ltd.

**Development of the World's First All-Glass-Ceramic, All-Solid-State Sodium (Na) Ion Secondary Battery Using a Glass-Ceramic Solid Electrolyte**

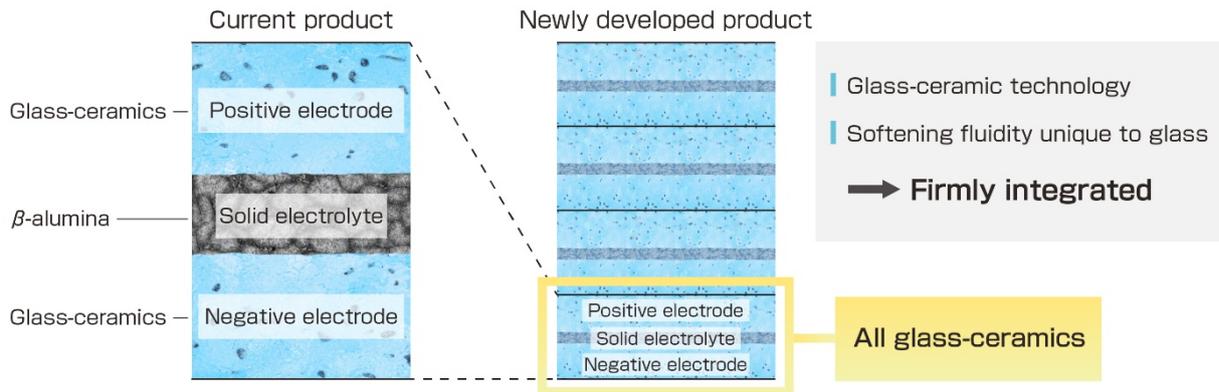
Nippon Electric Glass Co., Ltd. (Head Office: Otsu, Shiga, Japan; President: Akira Kishimoto) has developed a glass-ceramic solid electrolyte, which exhibits sodium (Na) ion conductivity surpassing organic electrolytes and a wide operating temperature range. By replacing the current  $\beta$ -alumina, the company has realized the world's first all-glass-ceramic, oxide, all-solid-state Na-ion secondary battery that uses glass-ceramics for all of the battery's key components.

Made entirely of glass-ceramics, the key components (positive electrode, negative electrode, and solid electrolyte) have been firmly integrated owing to the softening fluidity of the glass made possible by the company's proprietary technology. The result is the creation of a battery element\* with an excellent ionic conductivity path. Moreover, battery elements can be easily accumulated into a single battery, contributing to greater flexibility in battery design.

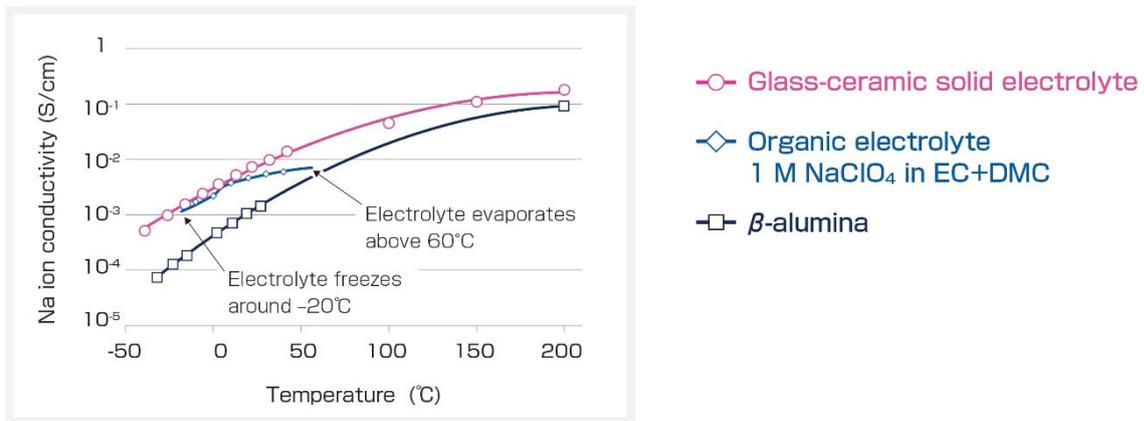
In addition to the benefits of using sodium, which is free from resource depletion, the battery comes with improved performance while retaining the current excellent properties such as no risk of fire or explosion. Nippon Electric Glass will continue to make active development efforts toward the practical application of safe and large-capacity power storage devices.

\* Basic structure—consisting of a sintered and integrated positive electrode, negative electrode, and electrolyte—of oxide, all-solid-state battery

■ Differences between the current product and the newly developed product of Nippon Electric Glass



■ Na ion conductivity



■ Integrated battery (prototype)

