

New fuel cell development in Japan

For decades, experts have agreed that solid oxide fuel cells (SOFCs) hold the greatest potential of any fuel cell technology. With low cost ceramic materials, and extremely high electrical efficiencies, SOFCs can deliver attractive economics. But there are significant engineering challenges inhibiting the commercialisation of this promising new technology: conventional SOFC stack are bulky and expensive, in terms of both materials and handling. Japan-based FCO Power Inc. aims to overcome those challenges through the development of a palm-size SOFC stack for residential fuel cell systems in existing apartments, which can be produced cost effectively as Tomohiko Hibino, FCO Power CEO, explains.

FCO Power has been working on the development of its new generation SOFC stack for almost a decade. The company is still in the process of making the technology more stable, says Mr. Hibino, but the plan is to have it ready for commercialisation for residential fuel cell system applications by 2020. The focus will initially be on Japan; in the aftermath of the Fukushima accident, the country has a real need for environmentally friendly alternative energy sources, as underpinned by the fact that FCO Power conducted part of this development with the support of a New Energy and Industrial Technology Development Organization grant. The company is also supported by one of Japan's leading tech investors, The University of Tokyo Edge Capital.

Mr. Hibino points out that their SOFC stack will be designed for existing Japanese apartments. As space is at a premium in these apartments, one their main priorities is to make the stack as compact as possible. Equally important is making the stack easy and cost-effective to produce. Although SOFC systems for residential use have already been commercialised, the current target market is limited to detached houses and some newly-built apartments. Existing apartments, which account for approximately 40 percent of housing in Japan, are out of scope. The main reason is that the conventional SOFC stack is bulky and high cost. However, FCO Power is developing a next-generation stack, which is only 3 cm thick for 700W residential system by leveraging the Printed Fuel Cell™, a unique high

volumetric power density and low-cost SOFC. The process involves fabricating an individual fuel cell layer by layer, as in 3-D printing, and then sintering all the layers together at once.

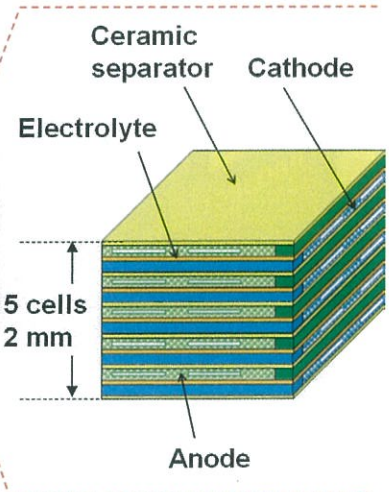
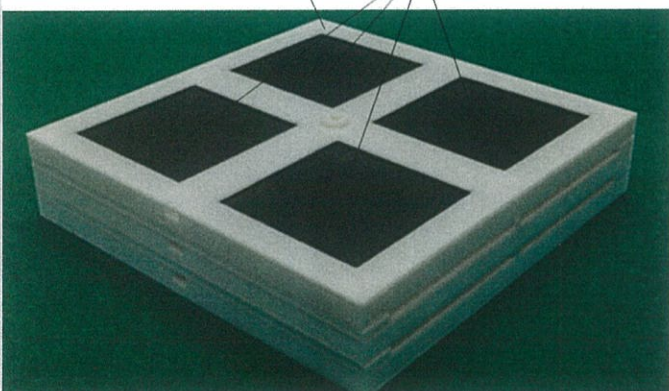
The Printed Fuel Cell™ has a simple, thin laminated structure that requires a limited amount of material and parts, making it suitable for low-cost, automated mass production.

Mr. Hibino adds that one of his responsibilities is to find suitable partners to realise their ambition of getting the technology to the commercialisation stage. He is interested in working with manufacturers who have multiple stack production skills, in other words with system specialists. "We could license the technology or manufacture the stacks ourselves: we have not yet decided on a business model and are keeping our options open."



FCO Power Inc.
Website: www.ecobyfco.com

Ceramic manifold Stack array with 70W stacks



Next-generation SOFC stack with Printed Fuel Cell™ for existing apartments

Printed Fuel Cell™ appearance and conceptual diagram