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HAKUTO-R

Joint Release

August 22, 2019
Citizen Watch Co., Ltd.
ispace, inc.

Citizen Watch Becomes Corporate Partner of ispace's HAKUTO-R Program

Citizen to Apply Titanium Surface-Hardening Technology to Lunar Lander and Lunar Rover

TOKYO – August 22, 2019 – Citizen Watch Co., Ltd. ("Citizen"), a 100-year old Japanese watchmaker and one of the world's largest watch manufacturers, and ispace, inc. ("ispace"), a lunar exploration company headquartered in Tokyo, Japan, are pleased to jointly announce that Citizen has become a Corporate Partner of HAKUTO-R, the world's first commercial lunar exploration program.

As a key component of this partnership, Citizen will apply its *Super Titanium*™ material—pure titanium processed using Citizen's proprietary surface-hardening technology—to titanium components used in the HAKUTO-R lunar lander and lunar rover.

Selected by ispace's engineers for its light weight and strength, titanium will be used for various mechanical parts in the HAKUTO-R lander and rover. As a lightweight, scratch- and corrosion-resistant material developed by Citizen for its watches, Citizen and ispace aim to use *Super Titanium*™ to improve the reliability and environmental resistance of the HAKUTO-R spacecraft's titanium parts.

Super Titanium™ is developed using Citizen's proprietary technology, called "Duratect", which uses special treatment techniques—including ion plating, cold plasma, gas hardening and duplex coating—to produce a titanium material that is 6x harder than stainless steel with excellent durability and abrasion-resistance, while maintaining the lightness of titanium. Through this partnership, Citizen will be procuring the pure titanium material, process it using the Duratect treatment technology, and apply it to the relevant HAKUTO-R lander and rover parts.

Following Citizen's release of the world's first watch made of pure Titanium in 1970, Citizen set out to bring out titanium's best qualities. It was after many years of R&D when Citizen developed its proprietary Duratect technology. Now, through its partnership with HAKUTO-R, Citizen Watch Co., Ltd. will utilize its manufacturing technology—only ever intended for use on Earth—for the use of lunar exploration.

Following the HAKUTO-R missions, ispace and Citizen will examine the results of the *Super Titanium*™ application on HAKUTO-R's lunar lander and rover and proceed to develop it as a common application used in lunar exploration.

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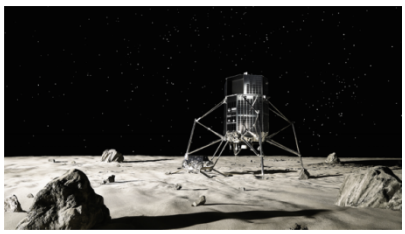

- **Takeshi Hakamada, Founder & CEO, ispace**: "The application of Citizen's titanium watch technology to HAKUTO-R's lunar lander and rover provides a clear example of how industrial techniques used on Earth can provide viable solutions to spacecraft engineering. We will continue to actively work with our partner companies to challenge the conventional way of thinking about space development."

Citizen Watch Co., Ltd. https://www.citizenwatch-global.com/index.html

CITIZEN WATCH is a true manufacture d'horlogerie with a comprehensive manufacturing process that extends from creating a watch's individual components to its final assembly. The company operates in more than 140 countries and regions around the world. Since its founding in 1918, CITIZEN have held the belief of "Better Starts Now" — that is, no matter who you are and what you do, it is always possible to make something better, and now is the time to start doing it. Sharing this belief, we have made watches, invented and improved technologies and explored the future of watches such as our proprietary light-powered Eco-Drive technology and state-of-the-art satellite-synchronized timekeeping.

ispace, inc. https://ispace-inc.com/

ispace, inc. (ispace) is a private lunar exploration company with a vision to extend human presence beyond Earth. The company has 100 staff from 13 different countries; operates in Japan (HQ), the United States and Europe; and has signed partnerships with the Japan Aerospace Exploration Agency (JAXA) and the Government of Luxembourg. ispace raised nearly $95 million (USD) in Series A funding—the largest on record in Japan and more than almost any other space company in history. ispace also managed Team HAKUTO, one of the 5 finalists in the Google Lunar XPRIZE competition.

HAKUTO-R https://ispace-inc.com/hakuto-r/

HAKUTO-R is the world's first commercial lunar exploration program. It includes ispace's first two lunar missions: Mission 1, a soft lunar landing in 2021, and Mission 2, a lunar landing and deployment of a rover for lunar surface exploration in 2023. For both missions, ispace's lander will be a secondary payload on SpaceX's Falcon 9 rocket. The program is intended to lay the groundwork for a high-frequency, low-cost lunar transportation platform
The ispace / HAKUTO-R **Media Room** can be accessed here.

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