

# Bayonet-Flag Sample Holder Conversion System "Aquila"



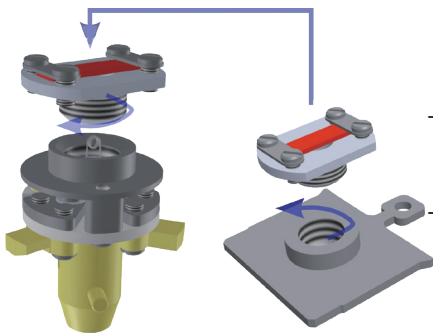
*Aquila*

Transit Chamber for Aquila

UNISOKU 6-Electrode Flag-Type Sample Holder

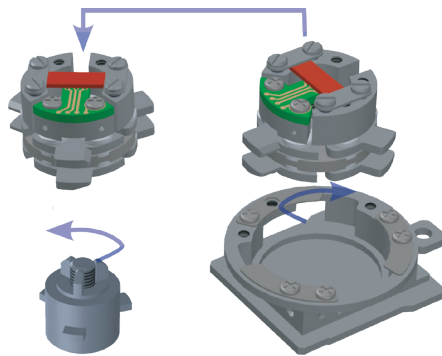
Conversion from a bayonet-type to a flag-type sample holder is now possible. By installing the transit chamber adjacent to the load-lock chamber, sample holder conversion can be carried out **while maintaining ultra-high vacuum conditions**. Furthermore, when used together with a vacuum suitcase, samples prepared or analyzed in other systems such as MBE\* or XPS\*\* can be transferred to the UNISOKU cryogenic high-magnetic-field STM.

\* MBE: Molecular Beam Epitaxy \*\* XPS: X-ray Photoelectron Spectroscopy



## Piggyback

- EB heating available in PREP < 1500°C and also in flag-type other system < 1500°C
- **1 electrode** available for measurement.



## "New" Aquila

- DC heating available in PREP < 400°C and also in flag-type other system < 400°C
- **6 electrode** available for measurement.

## Product Concept

Atomic-Scale  
mK and Vector Magnetic Fields  
Analysis

New Material Fabrication  
Macroscopic Analysis  
Materials Research

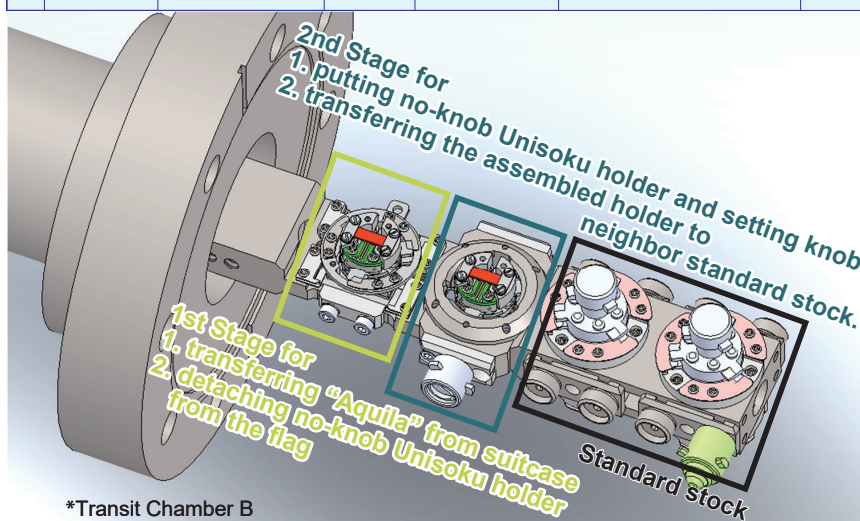
The flag-type sample holder has become the standard in sample fabrication and analysis systems. In particular, sample structures equipped with multiple electrodes are widely used, as they are suitable for fundamental characterizations such as conductivity measurements. This technology was developed to enable samples fabricated and analyzed with such flag-type holders to be measured using UNISOKU's standard 6-electrode holders for the USM1300/1600 systems. The core of this technology lies in the mechanism that allows the holder configuration to be converted under ultra-high vacuum. With this system, even multi-electrode samples prepared by wire bonding can be measured under cryogenic and high magnetic field environments using SPM or multi-electrode measurement techniques.

By introducing this mechanism, collaboration between researchers specializing in sample fabrication and those conducting measurements under extreme conditions can be facilitated, leading to accelerated and more efficient research progress.



# Applications

| No | Product Name     | Configuration                        | Holder Type | Number of Electrodes                            | Maximum Heating Temperature  | Description   | Applications   |
|----|------------------|--------------------------------------|-------------|---|--|---|--|
| 1  | Piggyback Holder | Flag+ Bayonet+ Sample Holder (img)   | EB          | 3<br>*Compatible with 6-Electrode Configuration | <b>1500°C</b><br>*Both bayonet-type and flag-type holders are capable of heating up to 1500 °C. After heating, appropriate measures are required to prevent screw galling or seizing.  | In the bayonet-type configuration, only one electrode can be used for measurement inside the UNISOKU STM head. The remaining two electrodes are employed as filaments for electron-beam (EB) heating. In the flag-type configuration, the sample stage is electrically connected to the flag, resulting in a single-electrode configuration.  | This system enables low-temperature and high-magnetic-field measurements (using UNISOKU SPM) without contaminating samples prepared or analyzed by material fabrication and analysis systems such as MBE or XPS. To perform holder-type conversion under ultra-high vacuum conditions, the Piggyback System, which includes the transit chamber shown below, is required. If purchased as a standalone unit, the holder must be taken out of the load-lock chamber for conversion, and the conversion must be carried out either in air or under an inert gas atmosphere.  |
| 2  | Aquila Holder    | Flag+ Bayonet+ knob(img)             | DC          | 6   | <b>400°C</b><br>*Both bayonet-type and flag-type holders can be heated up to 400°C.<br>By removing the four-electrode plate (green part), the number of available electrodes is reduced to two; however, the heating capability increases — up to approximately 1300°C for the bayonet type and 900°C for the flag type. | In the bayonet-type configuration, six electrodes are available for measurement inside the UNISOKU STM head. In the flag-type configuration, all six bayonet electrodes are mounted on the flag to allow proper wiring. As a result, all six electrodes are electrically connected to the flag, forming a single-electrode configuration.   | In addition to the above applications, this system can also be used for wiring processes such as wire bonding. It enables low-temperature and high-magnetic-field measurements (using the UNISOKU SPM and multi-electrode conductivity measurement systems) without contaminating the samples. To perform holder-type conversion under ultra-high vacuum conditions, the Aquila System, which includes the transit chamber shown below, is required. If purchased as a standalone unit, the holder must be taken out of the load-lock chamber for conversion, which must then be carried out either in air or under an inert gas atmosphere. |
| 3  | Piggyback System | Piggyback Holder + Transit Chamber A | —           | —   | —  | With a specially designed transfer rod and stock base installed in the transit chamber, holder-type conversion can be performed under ultra-high vacuum conditions. The transit chamber is connected adjacent to the load-lock chamber.<br>* If this system is purchased together with a USM unit, the holder conversion mechanism can be integrated into the heating stage of the preparation chamber instead of the load-lock chamber (eliminating the need for the transit chamber). | —  |
| 4  | Aquila System    | Aquila Holder + Transit Chamber B    | —           | —   | —  | —   | —  |



## Main Users

### Piggyback

- Oak Ridge National Laboratory (USA)
- Nanyang Technological University (Singapore)
- University of Tennessee (USA)

### Aquila

- Max Planck Institute (Germany)
- Aarhus University (Denmark)

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