

# Ushio: Your Partner for Clean Organ-On-Chip and Microfluidics Developments

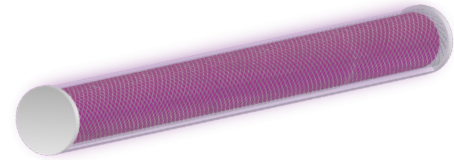
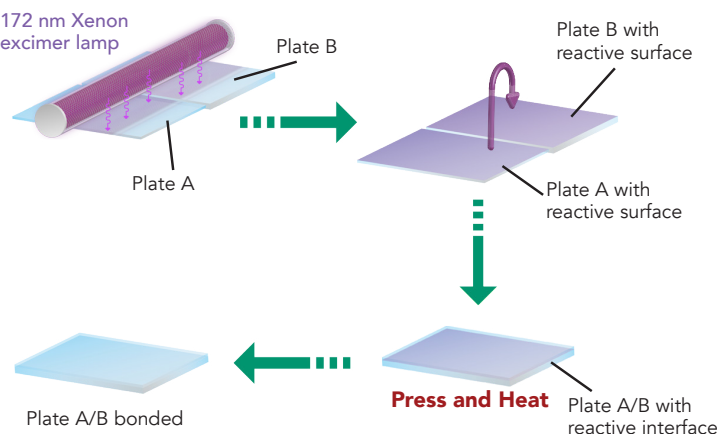
Ushio's Photobonding<sup>®</sup> approach has applications in organs-on-chips ("biochips") where residual glues and solvents must be avoided

## The Current Problem

In order to be effectively used to model diseases or evaluate the effectiveness of potential drugs, organ-on-chip devices must simulate the biological function, structure, and illnesses of human organs. However, in the production of traditional biochips, bonding is done with glues or organic solvents, and these can cause problems later if leakage or elution occurs. Such undesirable chemical impurities can cause chemical stress to cells, leading to genetic mutations and modifications of the signal transduction pathways. In such cases, the results of the experiments are compromised.

## Ushio's Solution

Ushio's Photobondin<sup>®</sup> process uses only a 172 nm Xenon excimer lamp as a light source to create the physical bond, so there is no risk of unwanted residuals leaking or eluting into the channels of the biochips. As a result, more accurate results are obtained.



## Key Benefits of Ushio's Technology

- Completely adhesive-free and solvent-free, so there is no unwanted elution
- Process performed under atmospheric pressure
- Depending on materials used, final devices can be resistant to heat, humidity, sunlight, and water
- Bonding surfaces can be designed with complex shapes
- Compatible with a variety of materials including PDMS, COP (cyclo olefin polymer), glass, and quartz

## Clean Bonding

Excimer lamps can be used for surface modification by inducing photochemical bond cleavage. A reactive surface can be generated which allows bonding surfaces together without the need for adhesives or coating agents. Only heat and pressure are required to effect a strong bond between the modified materials.

## Opportunities for partnership

Licensing the Photobonding<sup>®</sup> process

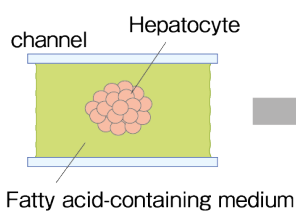
Joint developments for new organ-on-chip systems

## Examples of Organs-on-Chip developments accomplished by Ushio:

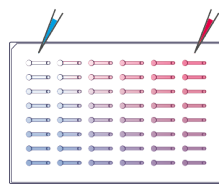
### NASH (non-alcoholic steatohepatitis) model

- o The NASH disease causes inflammation in the liver due to excess fatty acids in the blood
- o Through a collaborative research program, Ushio developed a chip to evaluate the effects of drugs using concentration gradients and iPS cells differentiated into liver cells

Cell culture in channels



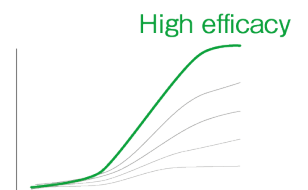
Drug stimulation



Quantitative imaging analysis



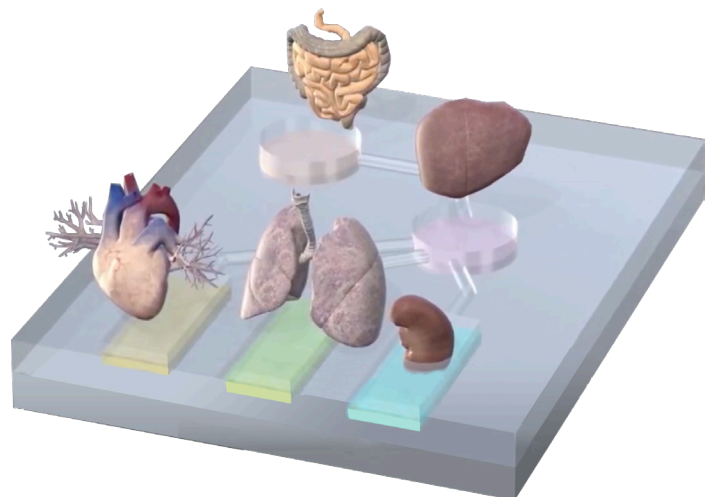
Evaluation of drug efficacy



## Background on Ushio

Founded in Japan in 1964, Ushio has decades of experience in light-based technologies, including Vacuum Ultra-Violet (VUV) light sources which have applications in semiconductors, LCD, and lithography. Ushio is now applying its technology expertise to organ-on-chip applications.

## Schematic of Organ-On-Chip



Please contact us for more information!

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