

# SAKAI LAB.

## [Development of Cellular Tissues for Transplantation and Application to the Evaluation of the Effects of Substances on the Human Body]

Department of Materials and Environmental Science

<http://envchem.iis.u-tokyo.ac.jp/sakai/index.php>

Organs and Biosystems Engineering

The School of Engineering

Department of Chemical System Engineering

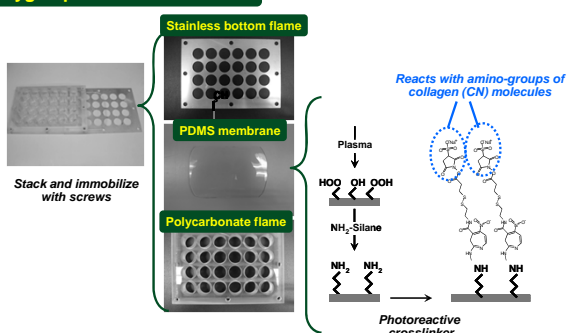
Department of Bio Engineering

## Reconstruction and Utilization of the Tissue

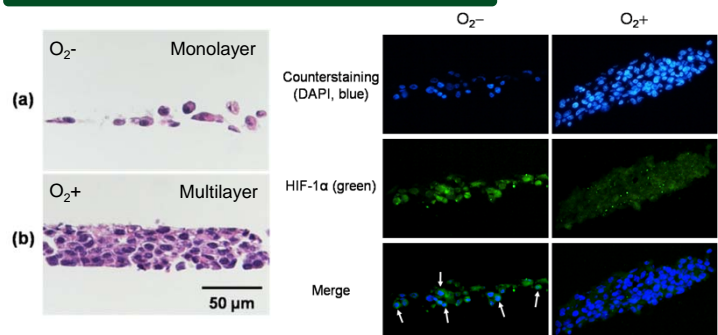
The general goal of our lab is the two- and three-dimensional organization of organ/tissue-derived cells, such as liver, pancreas, and lung cells, for regenerative medicine and cell-based assay for drug and chemical screening.

- ◆ Reconstruction and non-invasive harvest of a three-dimensional cell sheet on the oxygen permeable membrane coated with a cell adhesion controllable polymer.
- ◆ New cell-cell adhesion technique-based bottom up tissue engineering.
- ◆ Elucidation of ES and iPS cell differentiation under the microenvironmental conditions.
- ◆ Development of microfluidic system-based artificial micro-organs.
- ◆ Size control of two- and three-dimensional tissues by microfabrication techniques and application to drug and chemical screening.
- ◆ Development of non-invasive photoimaging systems for the cytotoxicity and cell quality evaluation based on the cell respiration metabolic activity.
- ◆ Development of a gas exposure device with a lung tissue for the atmospheric environment evaluation.

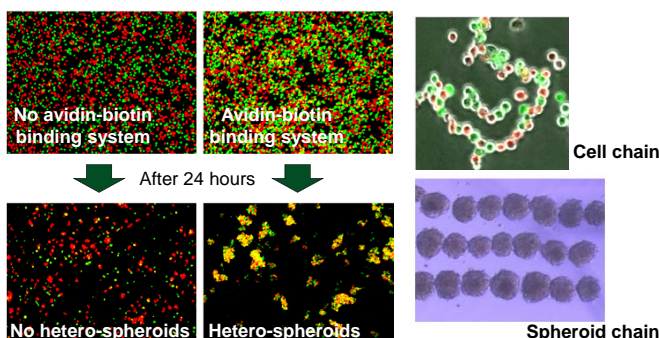
### Oxygen permeable membrane



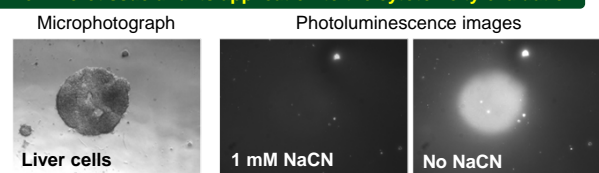
### Cross-section slices of three-dimensional liver tissues



### Bottom-up tissue engineering



### Liver microtissue and its application to the cytotoxicity evaluation



### Gas exposure device with a lung tissue

