



# Nishiyama-Miura Lab.

## Development of smart nanomedicine based on fine-tuning synthetic polymers

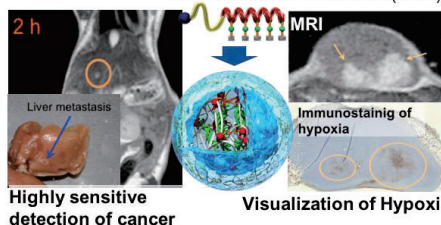
Molecular Materials Design Division, Laboratory for Chemistry and Life Science

<http://www.bmw.res.titech.ac.jp/index-e.html>

In Nishiyama-Miura laboratory, we develop nanomedicines based on the platform of fine-tuning synthetic polymers. By integrating various functionalities such as targetability and environment sensitivity, we aim to realize smart diagnosis and therapy in a spatiotemporally controllable manner.

### Nanomachine Contrast Agents

*Nat. Nanotech.* 11:724-730(2016)



Highly sensitive detection of cancer

Visualization of Hypoxia

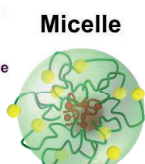
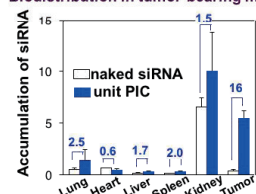
### Biofunctional Imaging

### Practical use of biomedicine



Ultra-small carrier for nucleic acids

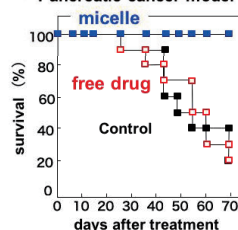
Biodistribution in tumor-bearing mice



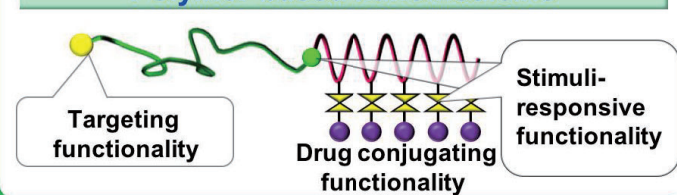
**Micelle**  
5 micellar formulations are under clinical development

### Effective non-toxic cancer therapy

Treatment of spontaneous Pancreatic cancer model



### Polymer-based nanomedicine



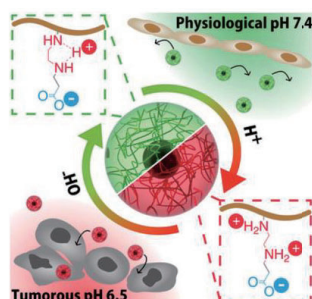
Targeting functionality

Drug conjugating functionality

Stimulative functionality

### Smart polymer responding to tumor microenvironment

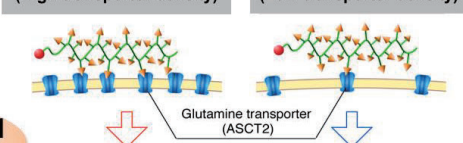
*Angew. Chem. Int. Ed.* 57:5057(2018)



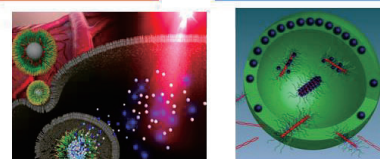
### New functional polymer

### Smart polymer with a high affinity to cancer cell

*Sci. Rep.* 7:6077(2017)



Multivalent interaction / Monovalent interaction

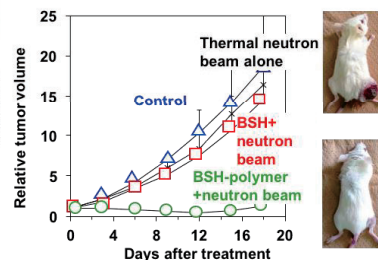
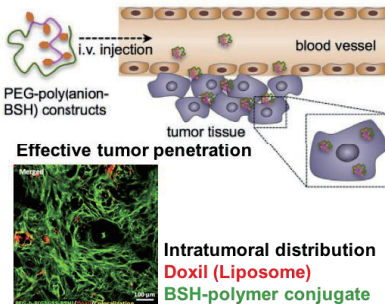


*Biomater. Sci.* 4:826(2016) / *Nat. Commun.* 5:3545(2014)

### Minimally invasive surgery

### Boron neutron capture therapy (BNCT) by BSH-polymer conjugates

*J. Control. Release* 254:1(2017)



Nishiyama-Miura Laboratory has established all the facilities and equipments necessary for the polymer synthesis, and creation and evaluation of smart nanomedicines. We welcome highly motivated students with a passion for developing innovative medicines.

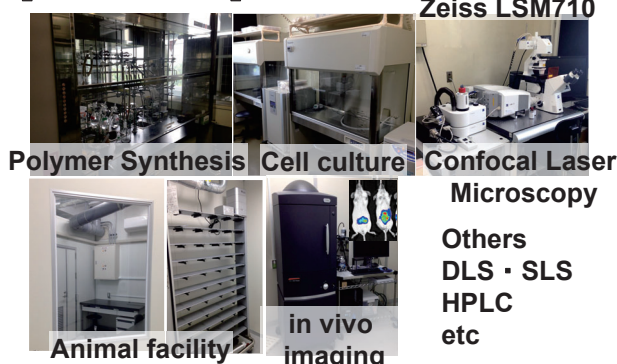
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Nishiyama-Miura Lab homepage

<http://www.bmw.res.titech.ac.jp/index-e.html>

### Our facilities



Zeiss LSM710

Polymer Synthesis

Cell culture

Confocal Laser Microscopy

Animal facility

in vivo imaging

Others  
DLS · SLS  
HPLC  
etc