BDR SEMINAR (Kobe/online hybrid)

Yuanyuan Guo

Frontier Research Institute for Interdisciplinary Sciences (FRIS),
Tohoku University

Wednesday, April 20, 2022

14:00-15:00

Large Conference Room, MI R&D Bldg. 2F, Kobe / Broadcast online via Zoom

Zoom meeting URL will be announced on the event day by e-mail.

※Non-BDR members: Please register from the following link.
https://krs1.riken.jp/m/bdrseminarregistration

Microelectronic fiber-based multimodal bio-interface

Summary

Cells inside of our brain are communicating via chemicals. It is important to study the in-brain chemistry to advance our fundamental understanding of the brain and accelerate the findings of targeted therapeutics for various neurological or psychiatric disorders. Recently, leveraging the thermal drawing process, we have successfully developed multifunctional fibers, with optical, chemical and electrical functionalities within a thin strand of fiber [1]. Lately, we further expanded fiber functionality with electrochemical sensing and actuation modalities, not only for advancing fundamental neuroscience studies but also for application in daily health monitoring. In this talk, I will discuss about our work in advancing fiber-based multimodal bio-interface with the focus on deciphering in-brain intrinsic chemical release.

First, I will introduce our recent development - the aptamer functionalization on microelectronic fibers for *in vivo* neurochemical sensing *(manuscript submitted)*. Then I will discuss about the deep-brain chemical imaging via polymer-fiber-coupled field effect sensors [2,3] as well as multielectrode-fiber-enabled bipolar electrochemistry[4,5]. Finally, not limited to sensing modalities, we recently succeeded in incorporating mechanical actuation within fibers, which enables fiber movement guided by sensing information *(PCT patent filed).*

Reference:
[1] S. Park, Y. Guo et al, Nature Neuroscience, 20(2017), 612–619.
[2] Y. Guo* et al, Biosensors and Bioelectronics, 174(2021), 112870.
[3] Y. Guo* et al, PloS ONE, 15(2020), e0228076.
[4] Y. Guo* et al., ACS Nano, 11(2017), pp. 6574-6585.
[5] T. Iwama, Y. Guo et al., Advanced Material Technologies, 2101066 (2021), 472-489.