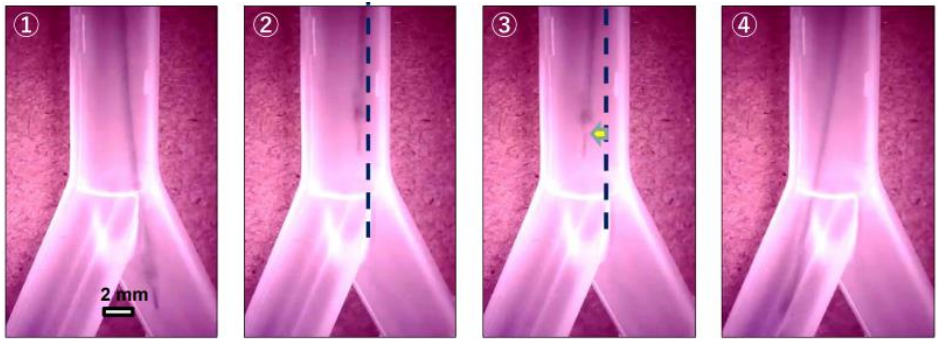
Tohoku Univ. Technology

Multifunctional fiber less than 1 mm in diameter

Multifunctional fiber equipped with electrochemical sensors, temperature sensors, optical fibers, hollow channels, etc., and actively driven



(1) right side (2) pull (3) bend (+4.0 V) (4) push (5) left side

Overview

The refinement of internal therapeutic devices, including the diminution and canalization of catheters, is crucial in mitigating patient discomfort. Further alleviation is achievable by amalgamating multiple functions into a single device, which enables one-time internal insertion, thus streamlining the process. Notably, there has been significant progress in engineering multifunctional catheters capable of directing optical fibers and an array of sensors to the target site via actuators with precise tip control. However, the typical diameter of these advanced catheters ranges between 2 to 6 mm, which unfortunately still imposes a considerable burden on patients.

This innovation introduces a multifunctional fiber with a sub-millimeter diameter, less than 1 mm, designed to minimize patient discomfort significantly. This slender, multifunctional fiber boasts the capability for active actuation and encompasses diverse functionalities, including an assortment of sensors—like electrochemical and temperature sensors—as well as the ability to emit light via an optical fiber and dispense substances through a hollow channel. Remarkably, the production method of this fiber is notably straightforward.

The accompanying illustration on the right delineates the utility of this novel fiber in the detection of dopamine, demonstrating that the fiber can successfully detect dopamine concentrations as low as 10 nM, substantiating its efficacy and potential in medical applications.

Product Application

- ☐ Active catheter
- ☐ Industrial sensor for microspace inspection
- ☐ Wearable devices

IP Data

IP No.	:	PCT/JP2023/015047
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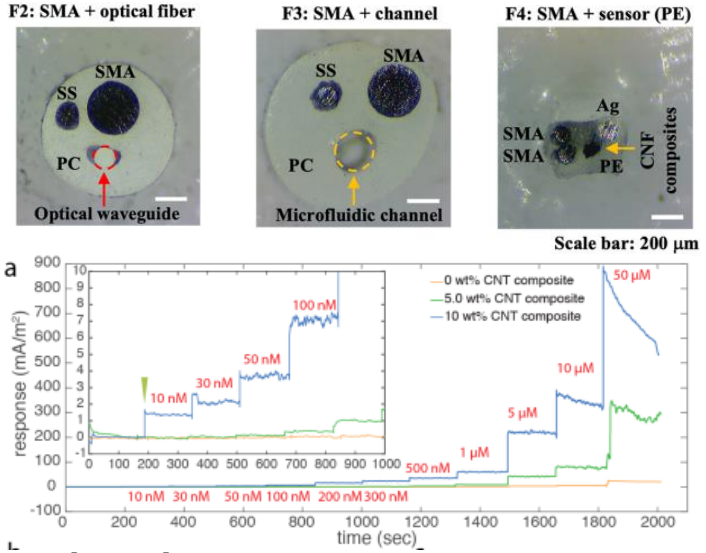
Features･Outstandings



Related Works

[1] New Technology Presentation Meetings 2022
[2] University Press Release 2023
[3] ACS Appl. Eng. Mater. 2023, 1, 822.

Contact

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