INTERNATIONAL FABRIC MACHINES INC.

5-11-22

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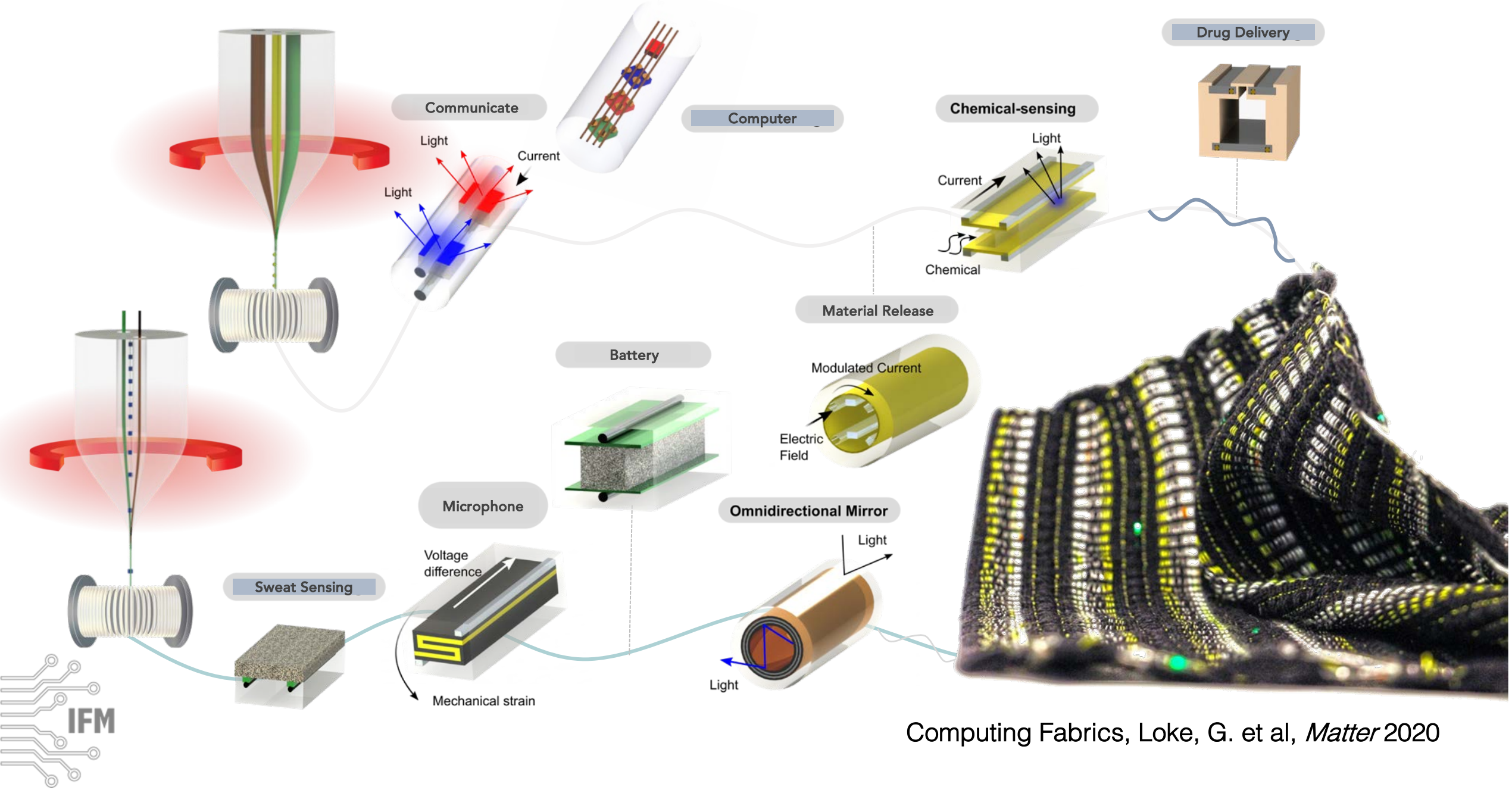
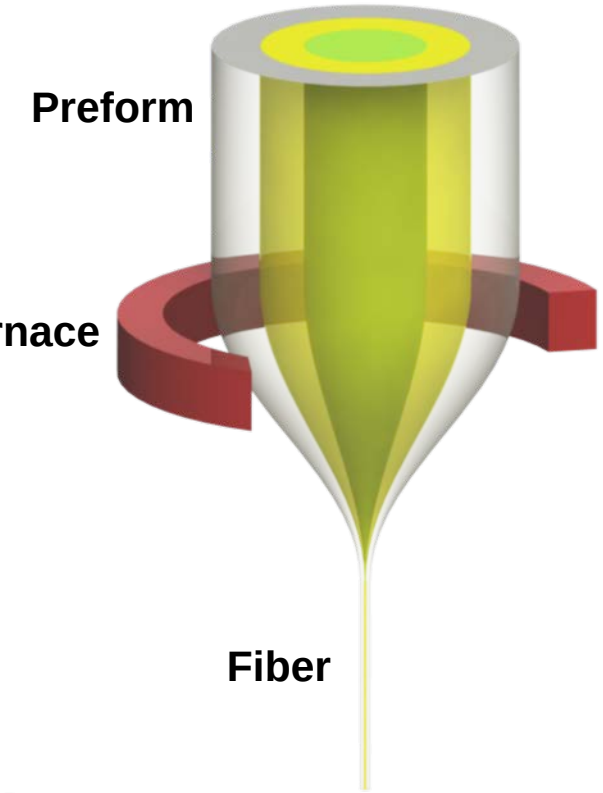
A Moore's Law for Fibers



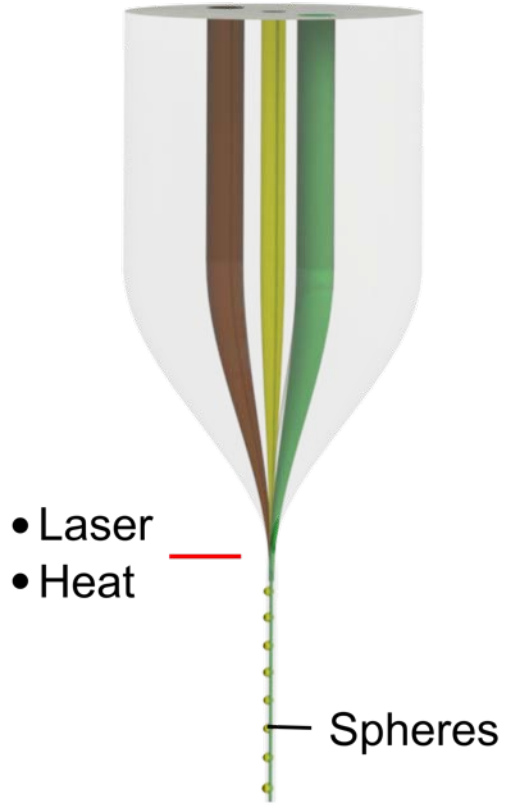
Computing Fabrics, Loke, G. et al, *Matter* 2020

Case I
Simple scaling



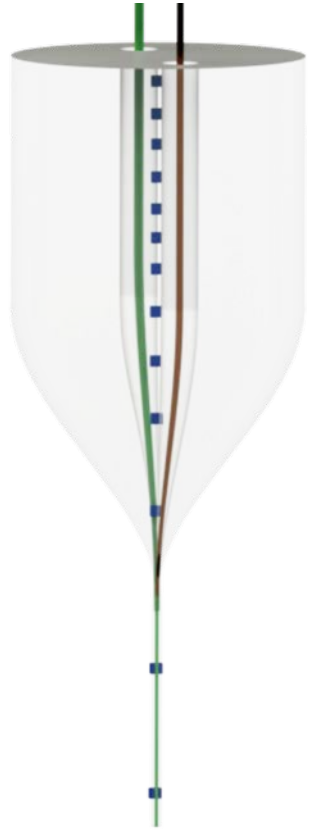
Microphones/ power

Case II
New geometry or composition



Morph

Case III
Particles flow but don't scale



Chip in fiber (video and memory)

"Recent Progress and Perspectives of Thermally Drawn Multimaterial Fiber Electronics" , Loke, G, *Advanced Materials* 2020

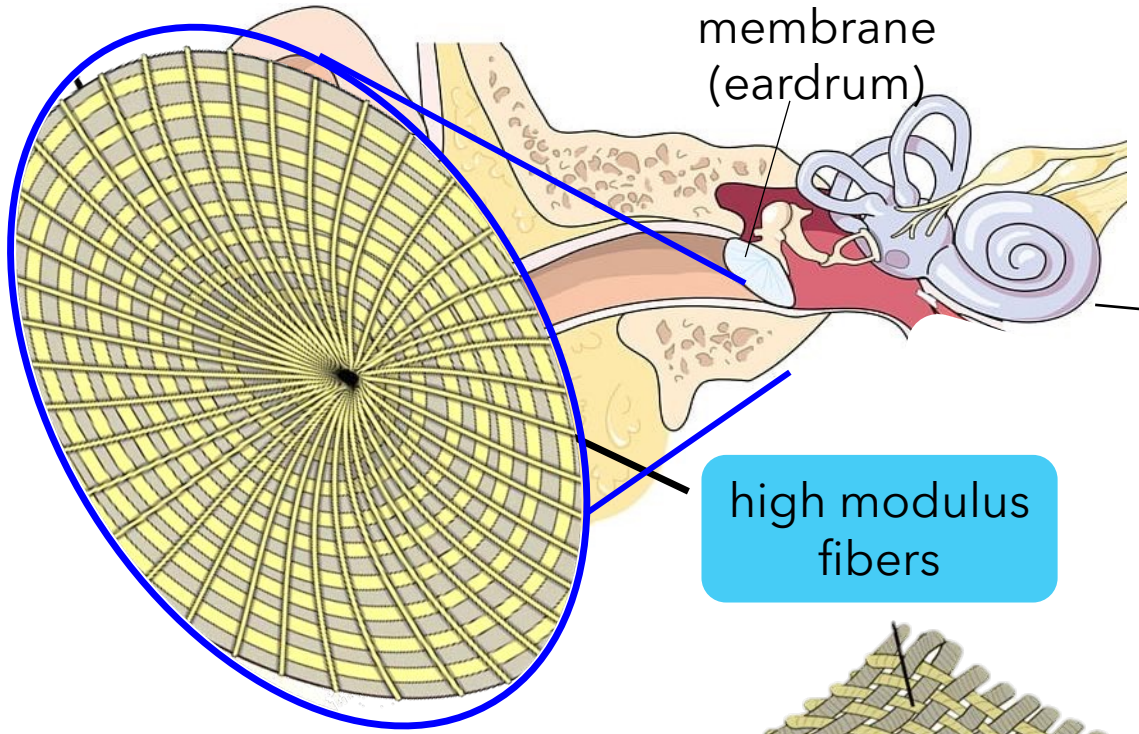
Article | Published: 16 March 2022

Single fibre enables acoustic fabrics via nanometre-scale vibrations

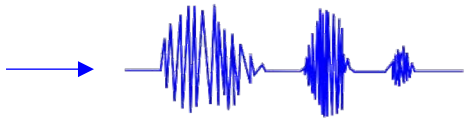
Wei Yan, Grace Noel, Gabriel Loke, Elizabeth Meiklejohn, Tural Khudiyev, Juliette Marion, Guanchun Rui, Jinuan Lin, Juliana Cherston, Atharva Sahasrabudhe, Joao Wilbert, Irmandy Wicaksono, Reed W. Hoyt, Anais Missakian, Lei Zhu, Chu Ma, John Joannopoulos & Yoel Fink

Nature **603**, 616–623 (2022) | Cite this article

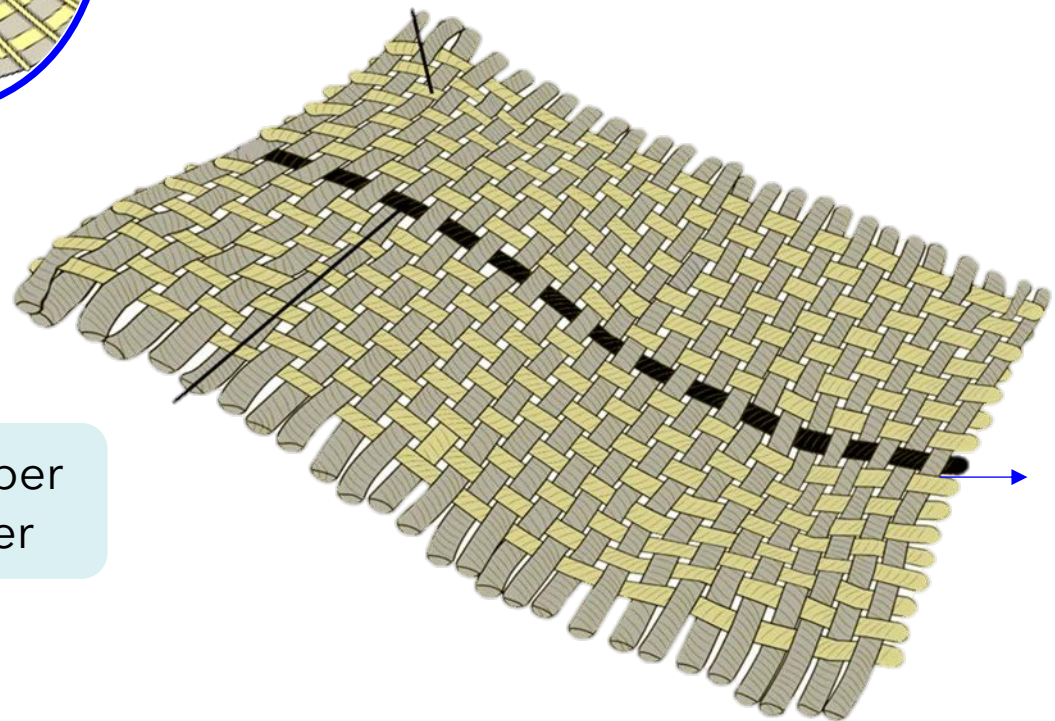
sound pressure
10^{-7} atm



electrical signals

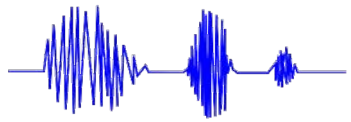


high modulus fibers



acoustic fiber transducer

electrical signals

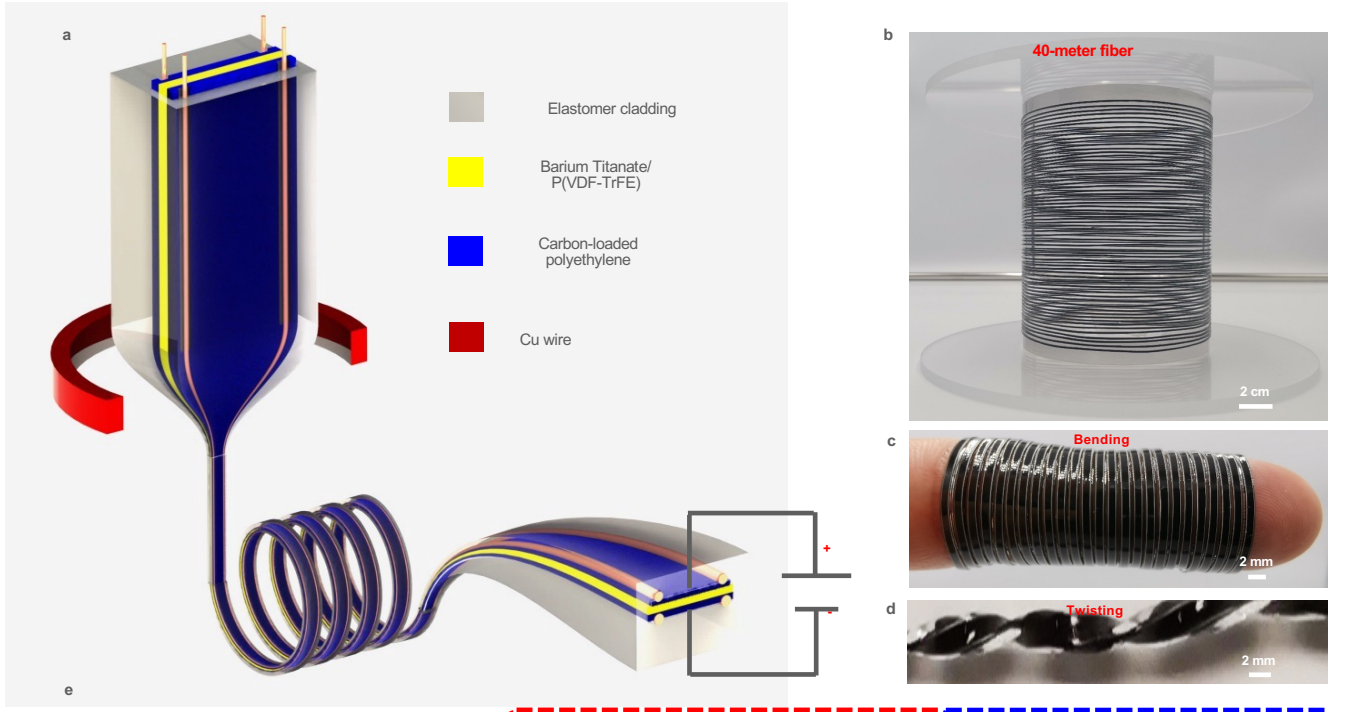


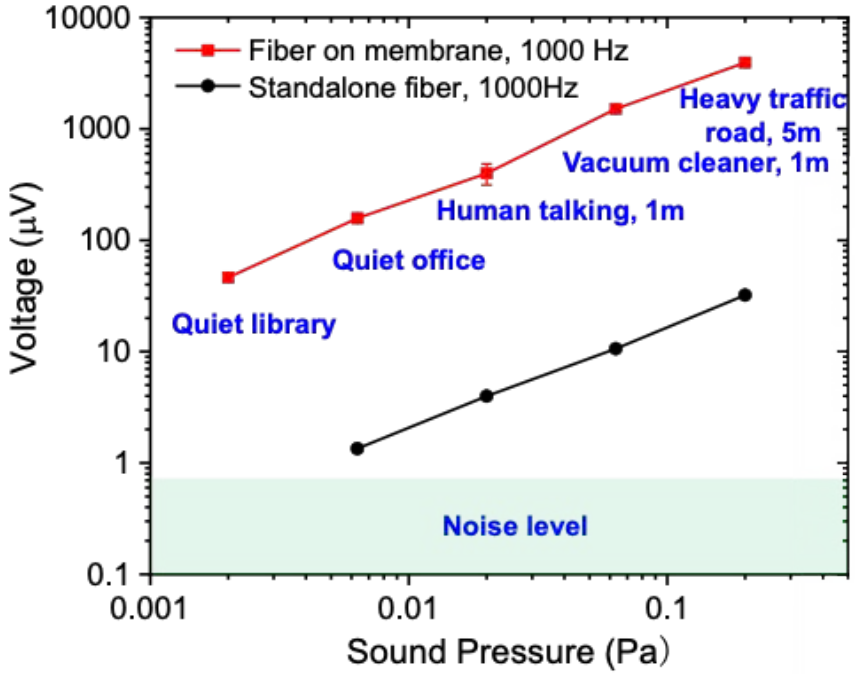
Preform: 2.5 (w) x 1.38 (t) x **18 (l) cm**

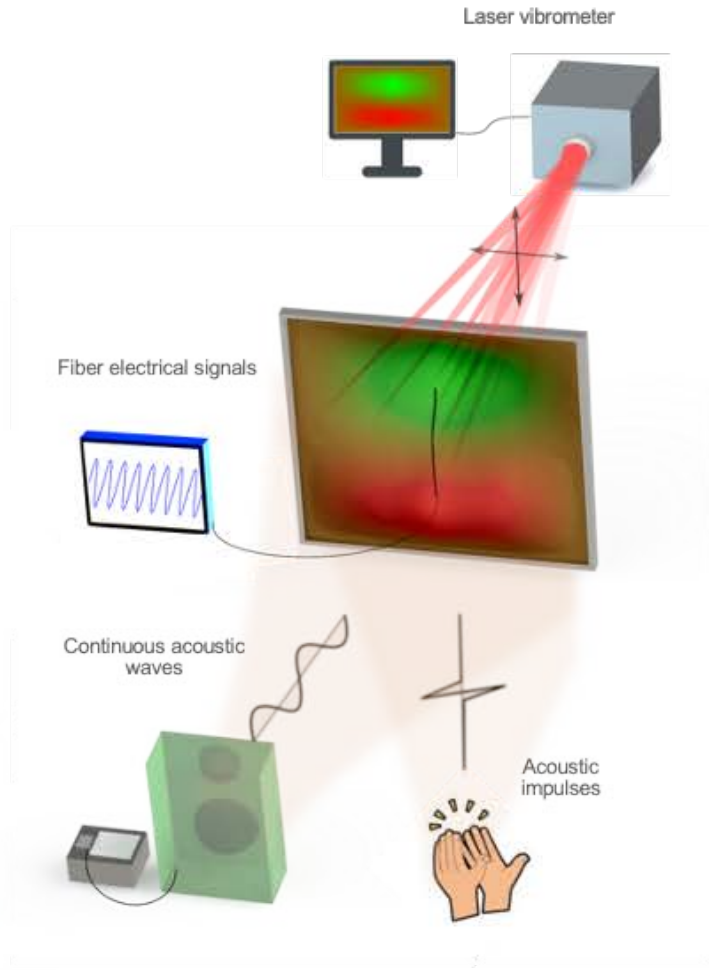
Fiber draw tower

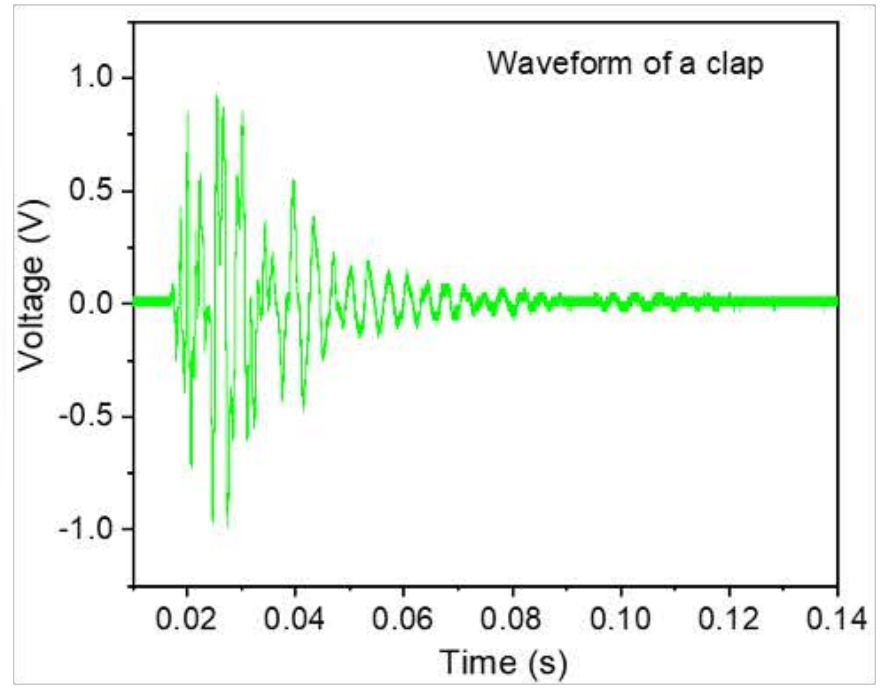
Fiber: **72-meter** fiber
(1.25 (w) x 0.69 mm (t))

IFM


a
Elastomer cladding
Barium Titanate/
P(VDF-TrFE)
Carbon-loaded
polyethylene
Cu wire
+
-
b
40-meter fiber
2 cm
c
Bending
2 mm
d
Twisting
2 mm
e
200 μm
CPE
Piezodomain
CPE
20 μm
2 μm
200 nm
f
50
40
30
20
10
d_{31} (pC/N)
Drawn P(VDF-TrFE)/BTO fiber
Drawn P(VDF-TrFE) fiber
Hot-pressed P(VDF-TrFE)/BTO composite
0
5
10
15
20
Dynamic stress (MPa)
g
0
40
80
120
Pa
140
120
100
80
60
40
20
Elastomer cladding

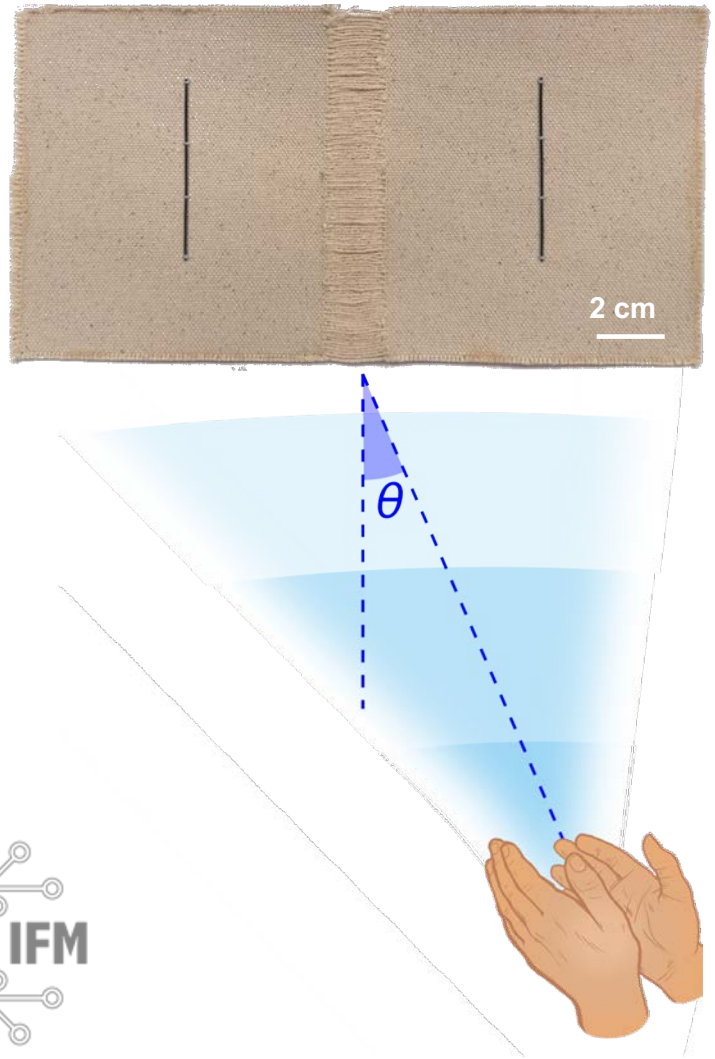

Fiber on membrane, 1000 Hz
Standalone fiber, 1000Hz
Heavy traffic road, 5m
Vacuum cleaner, 1m
Human talking, 1m
Quiet office
Quiet library
Noise level
Voltage (μV)
Sound Pressure (Pa)
10000
1000
100
10
1
0.1
0.001
0.01
0.1

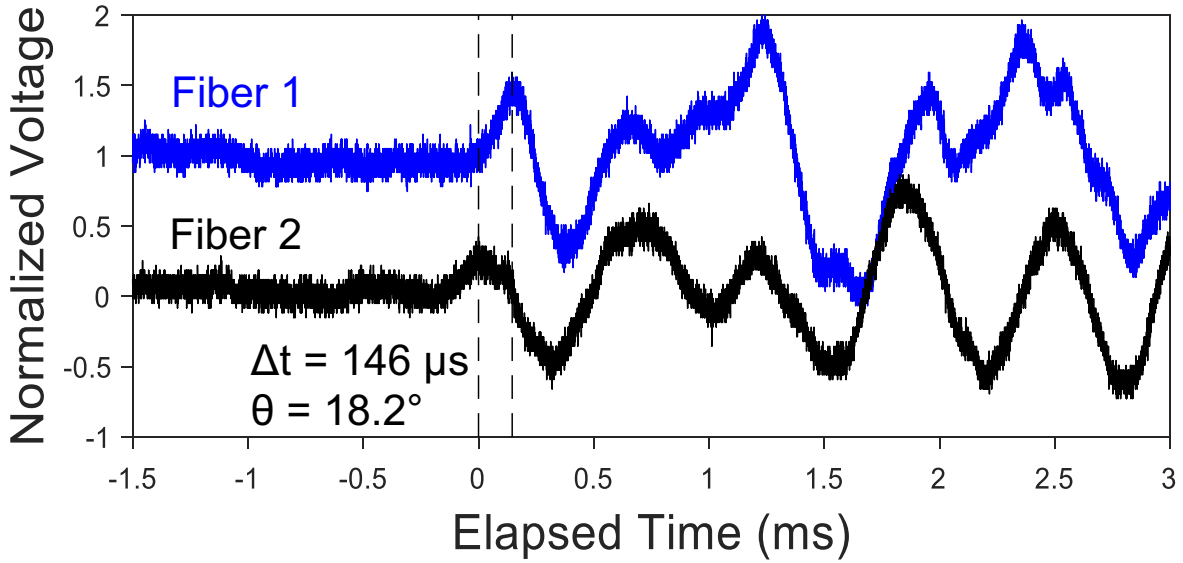

Laser vibrometer
Fiber electrical signals
Continuous acoustic waves
Acoustic impulses

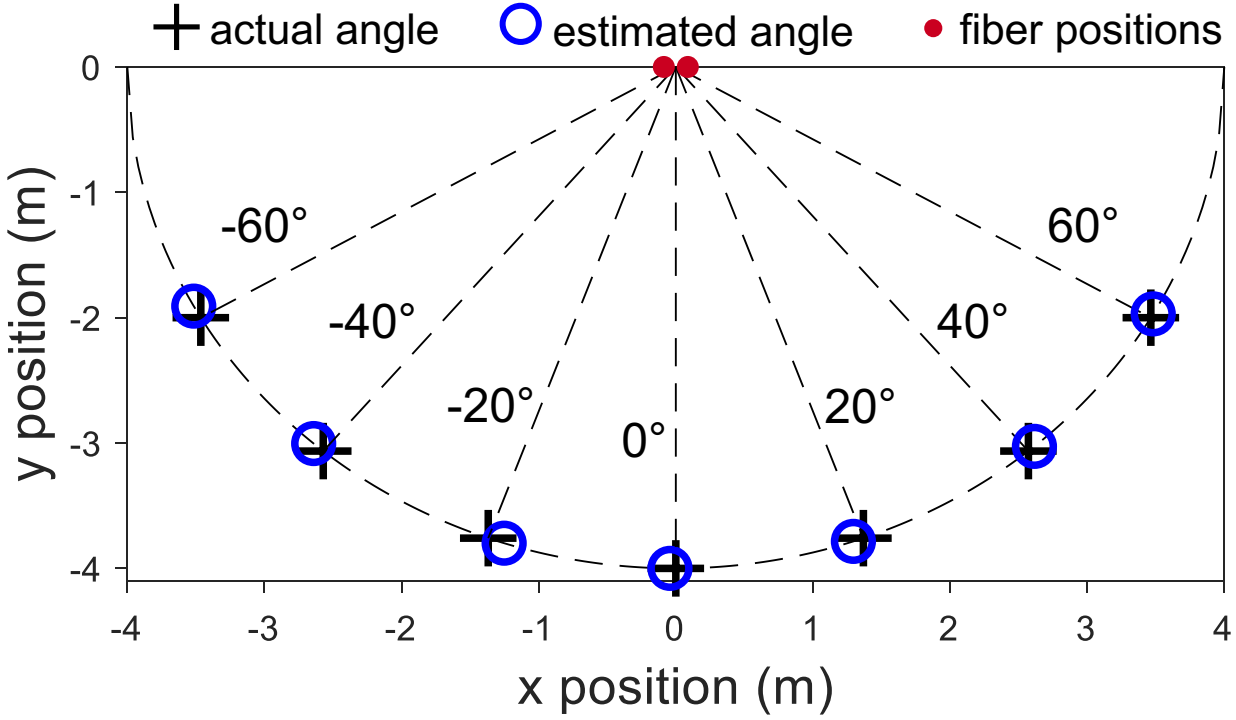

Waveform of a clap
Voltage (V)
Time (s)
1.0
0.5
0.0
-0.5
-1.0
0.02
0.04
0.06
0.08
0.10
0.12
0.14

IFM

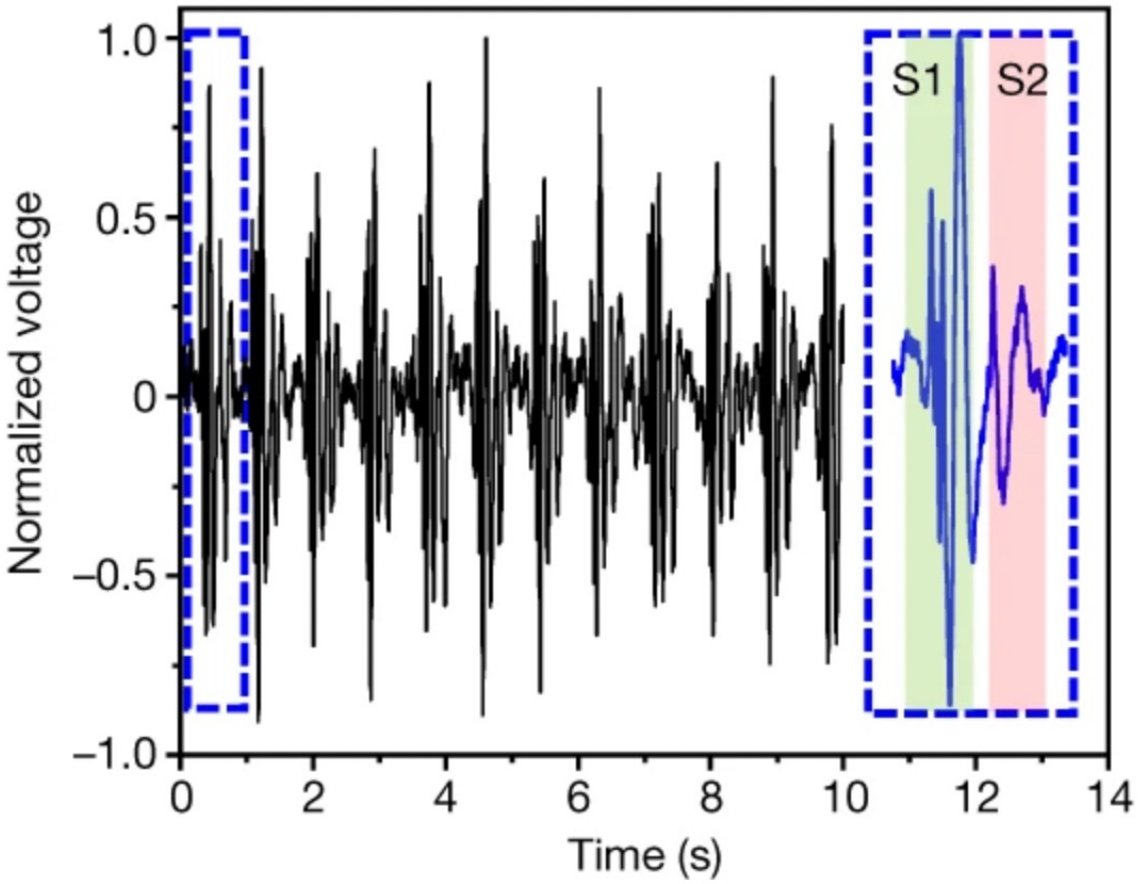
2 acoustic fibers accurately detect the direction of sound with an error of 1°.

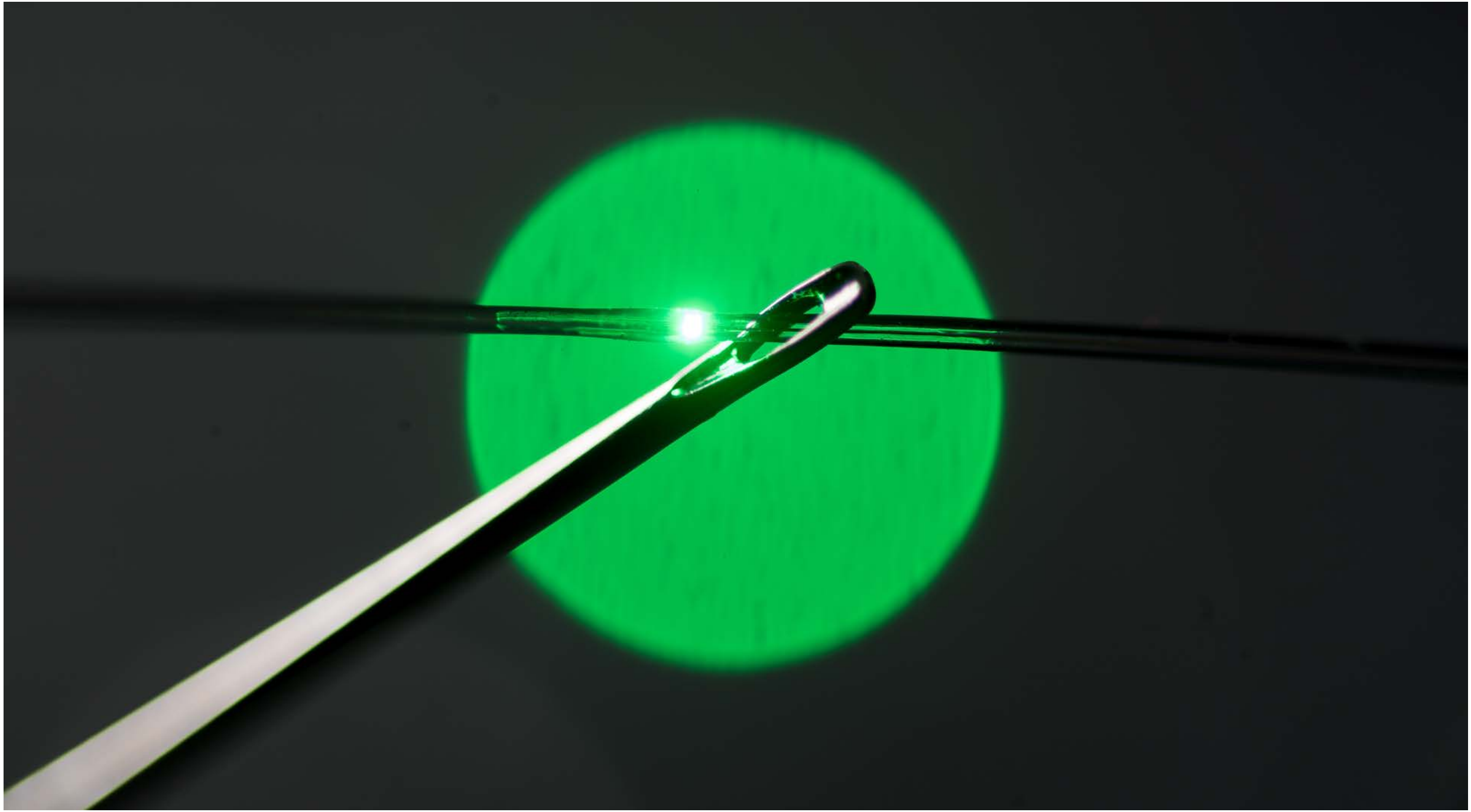




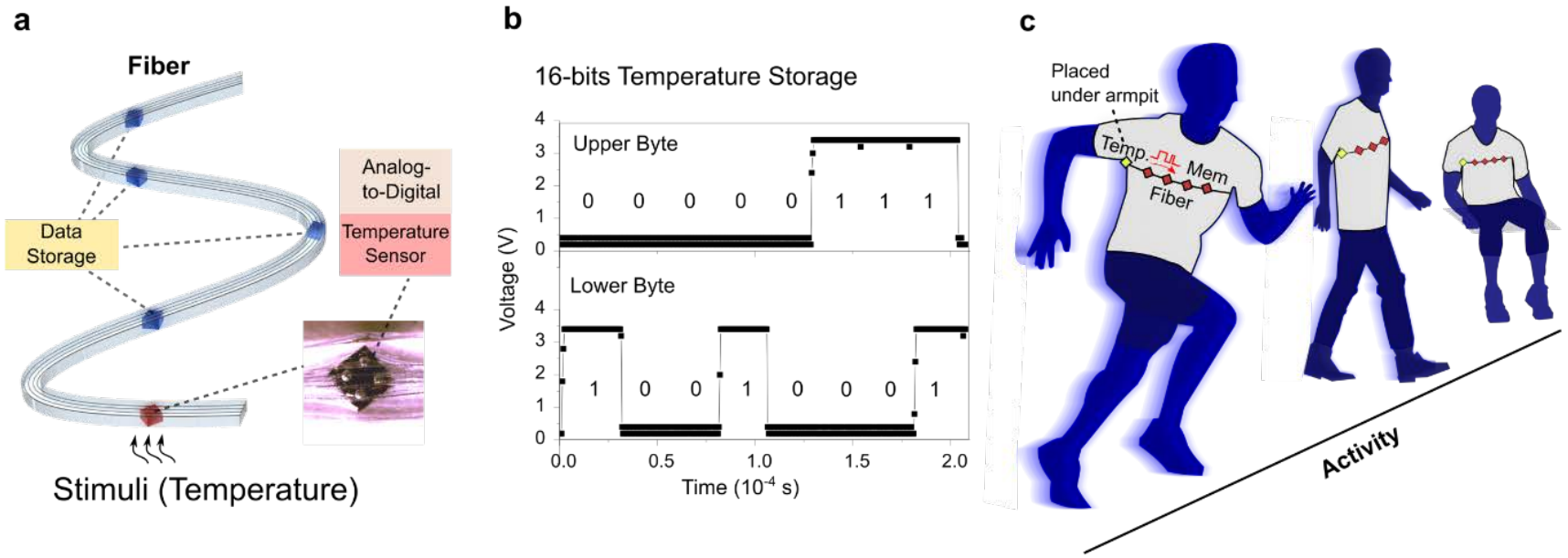


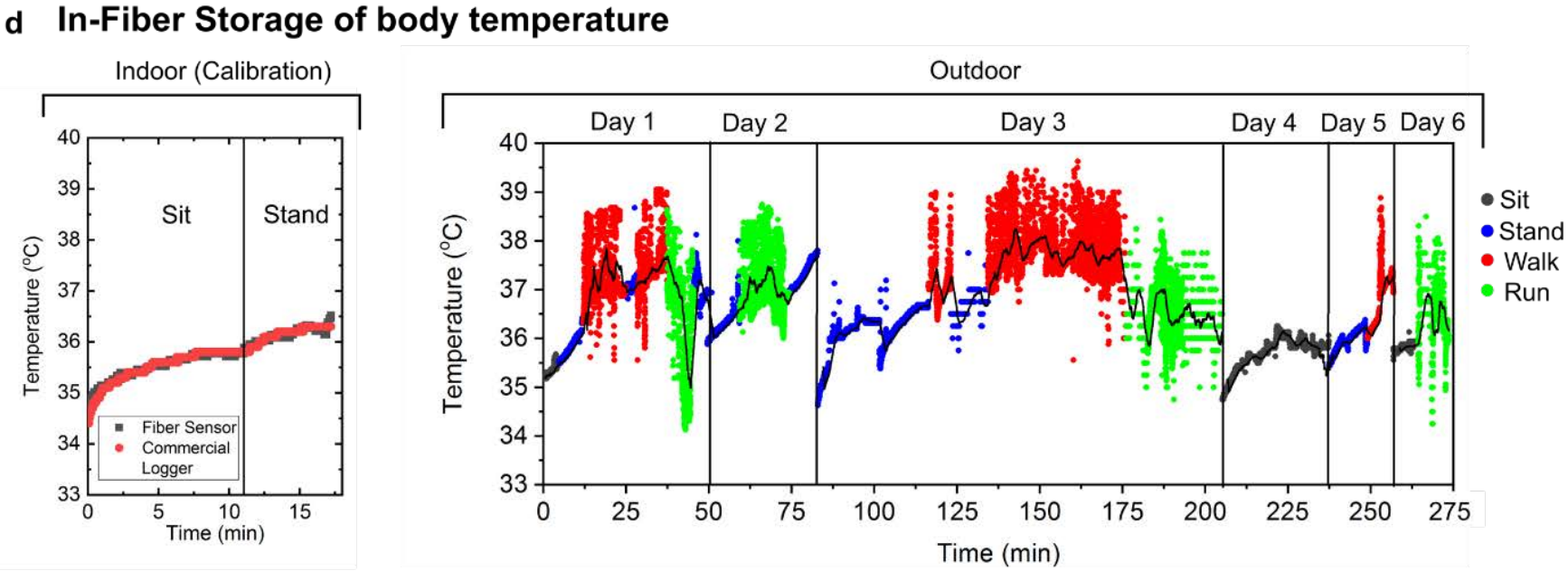
Fabric Stethoscope: Heart Sound Detection





Temperature Sensing and Memory in a Single Fiber





Our Capabilities

- Manufacturing facilities (Boston Seaport) to produce textile-ready fiber devices including microphones and other chip-in fiber technologies
- Exclusive commercial access to MIT acoustic fabric technology
- Only commercial entity with the technology to produce fibers with microchips (can be adapted to include functions like camera)

We are International Fabric Machines Inc. a Small Business dedicated to Delivering Fabric Computers

IFM

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