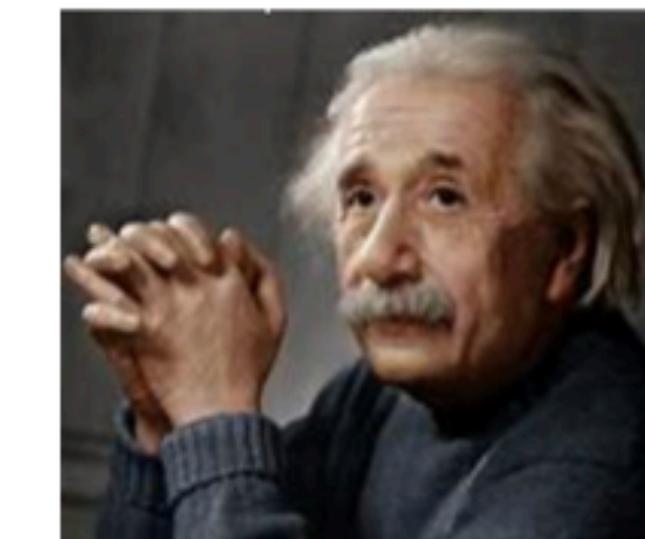
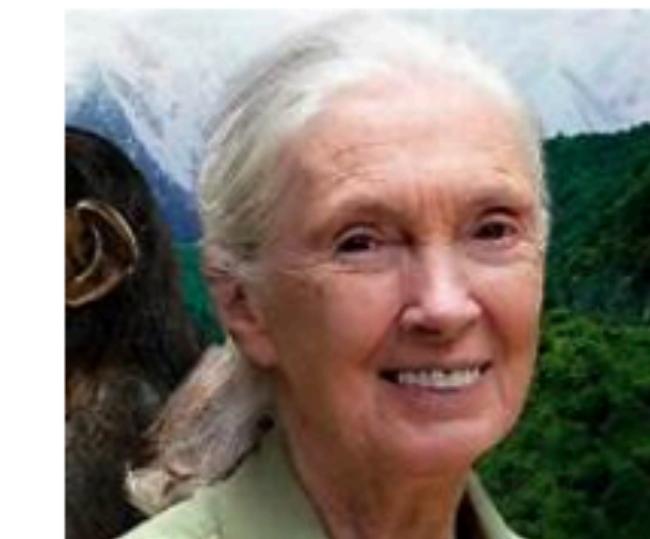


## *B I G   I D E A S   F O R U M - A N T H E M*

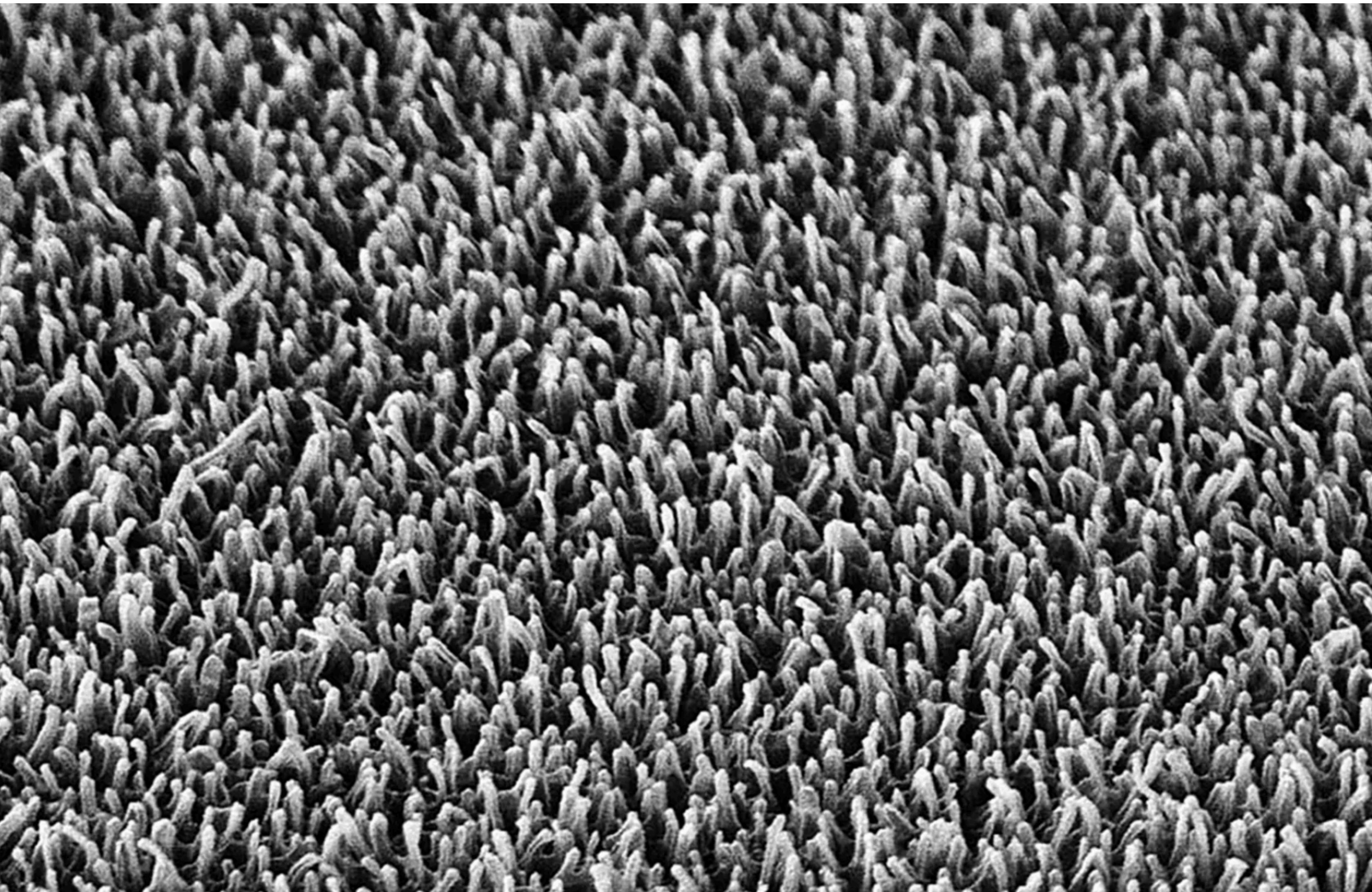


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# Tech Slam - Sept. 7, 2023

# Surface modification



# **Problem:**

**Hospital infections caused by  
increasingly drug resistant bacteria\*, fungi\*\***

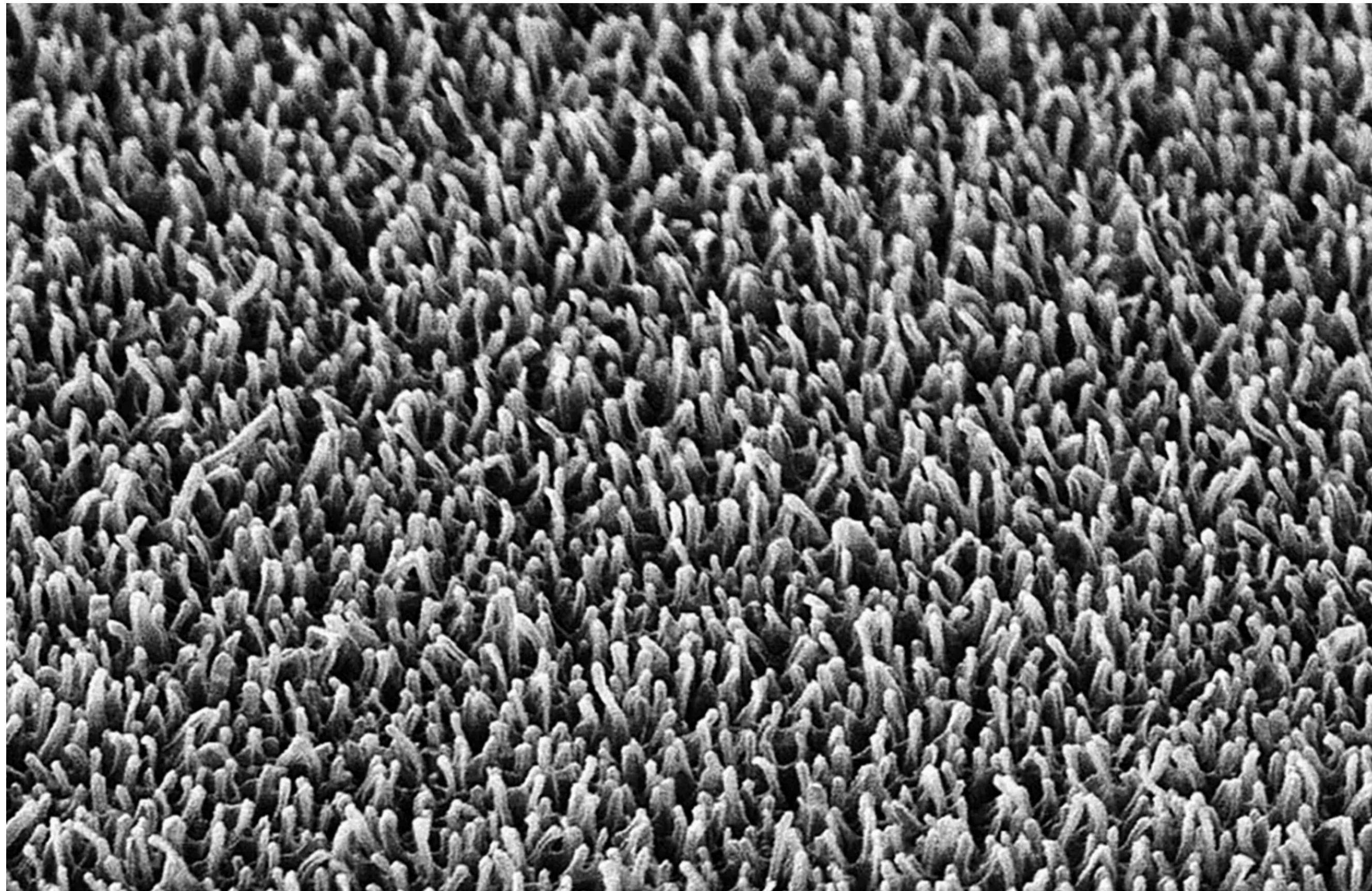
- Harmful/deadly if forming biofilms**
- Poor clinical outcome of surgeries  
with implants (titanium)**

**(\*) S. aureus; P. aeruginosa**

**(\*\*) Candida**

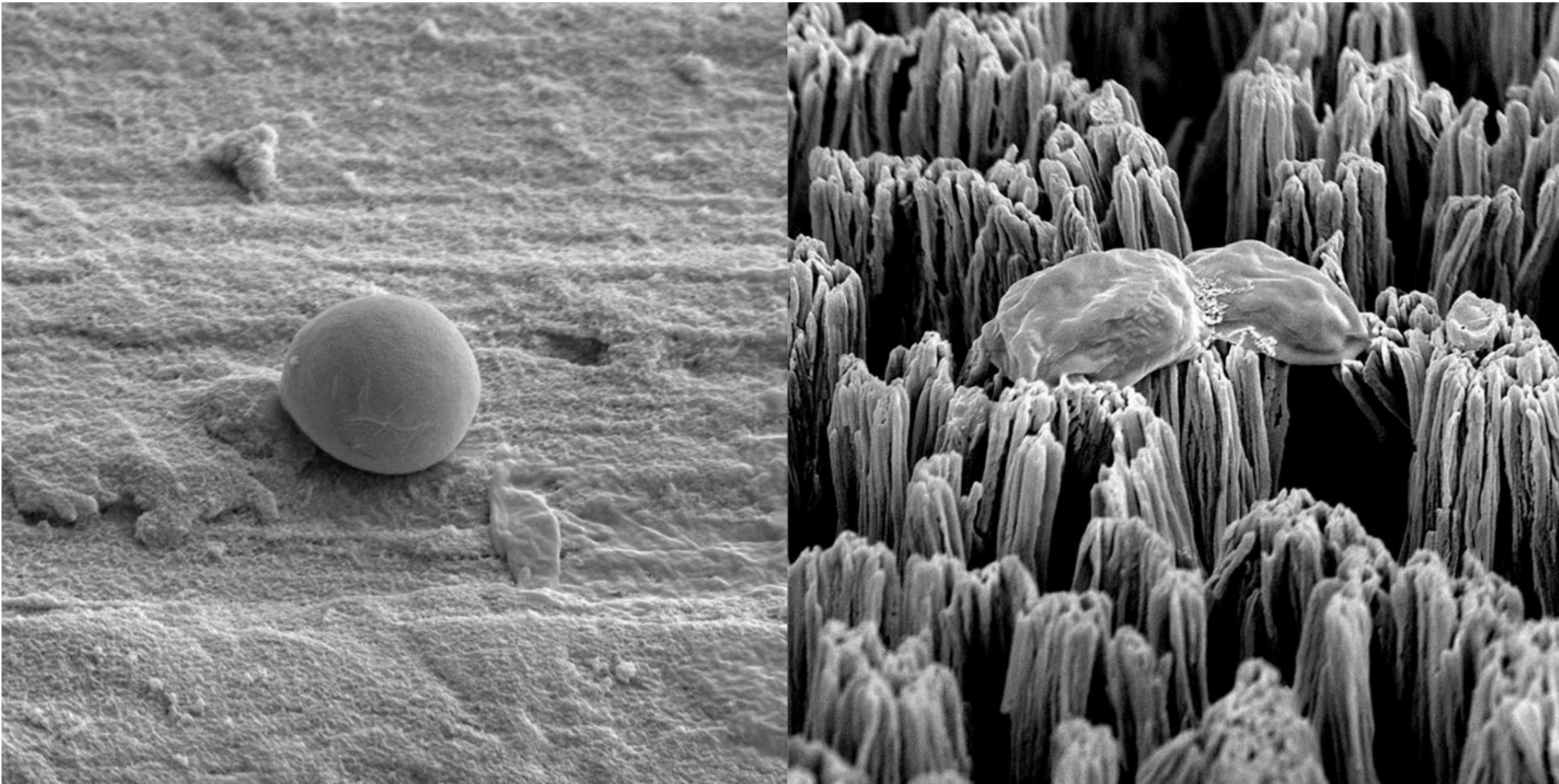
# **Discovery:**

**Grated surfaces kill bacteria  
(nano pillars)**



Created by relatively simple plasma etching technique

# Surface modification



**Cell structure of microorganisms are ruptured  
and cannot be re-generated**

# Practical Uses

- in medical devices
- dental applications or for other materials like
- stainless steel benches in food preparation and agriculture and restaurants

# Cancer detection



## Challenge

Waiting for cancer to grow large enough to be detectable in the bloodstream is too slow, and it doesn't tell you anything about where to find the tumor.

. . . and even slower in a scan

## Challenge

Waiting for cancer to grow large enough to be detectable in the bloodstream is too slow, and it doesn't tell you anything about where to find the tumor.

**The new questions are:**

What if we stopped *searching* for cancer altogether?

Instead:

What if we force the cancer to reveal itself?

# **Solution**

To *bioengineer* a signal that makes early tumors become visible.

## **Approach - step 1**

Bioengineered DNA is injected into the body; when it enters cancer cells, it forces them to produce a synthetic biomarker not found in humans—for example: limonene (a chemical found in the peel of citrus fruits).

If subsequent blood tests find traces of that biomarker, it could be a sign of cancer.

## **Approach - step 2**

The next step is figuring out where *exactly* the cancer is in the body.

- An injected compound forces the cancer cells to produce an enzyme that attaches to a radioactive tracer, rendering it visible to the naked eye in a scan.

### **Result:**

Localizing the cancer makes it treatable—clinicians can use precision radiation or targeted surgery to then take it out.