

Morphological Study of Cell Envelope in Electron Conducting Cable Bacteria

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How do cable bacteria filaments conduct electrons?

Understand their architecture!

- Cable bacteria (*Desulfobulbacae*) are filamentous and unbranched bacteria that can grow as long as 10 cm.
- *Via* long distance charge transport, the oxidation and reduction happens at two ends of a cable bacterium filament.

Long distance charge transport in cable bacteria

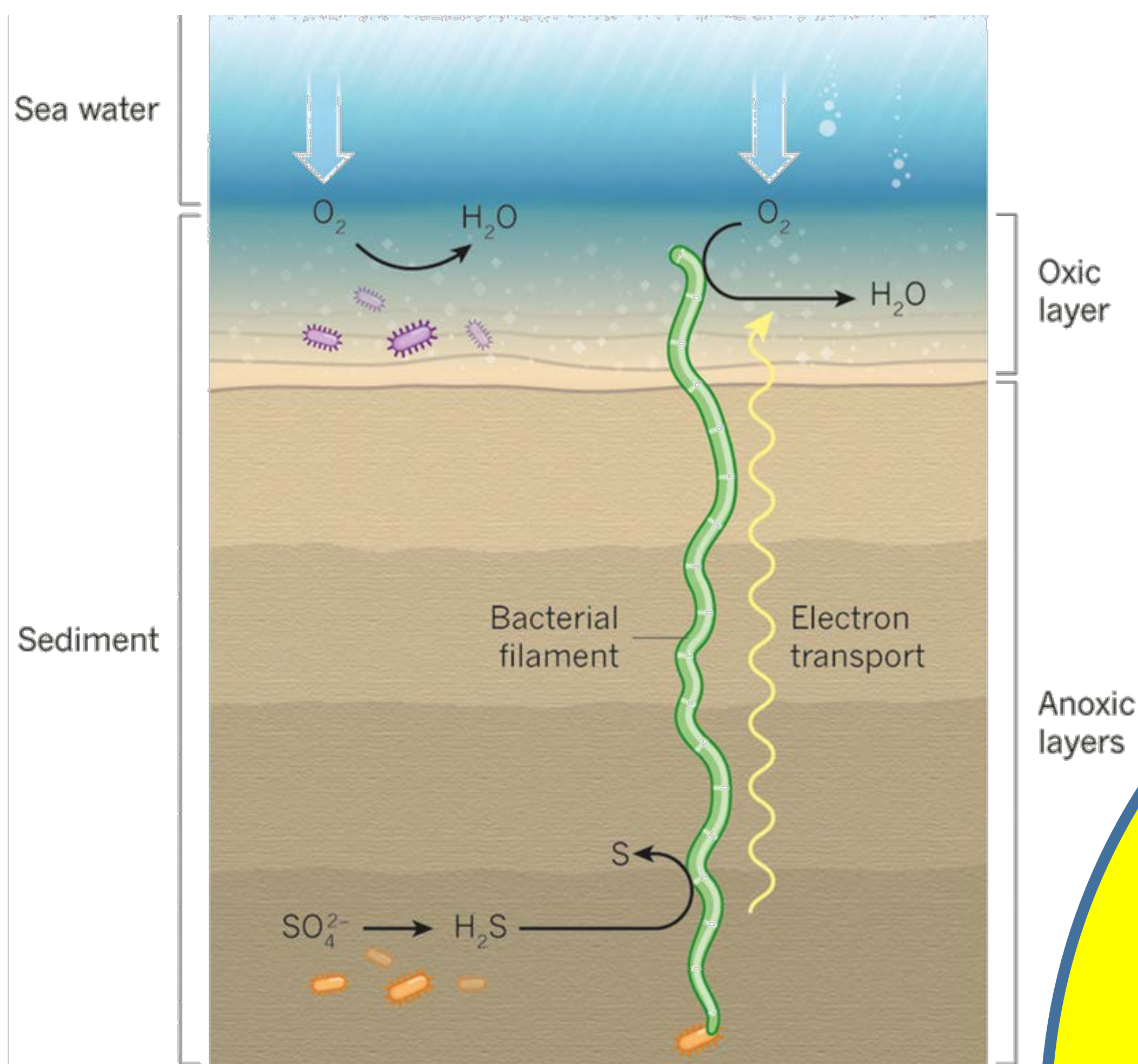
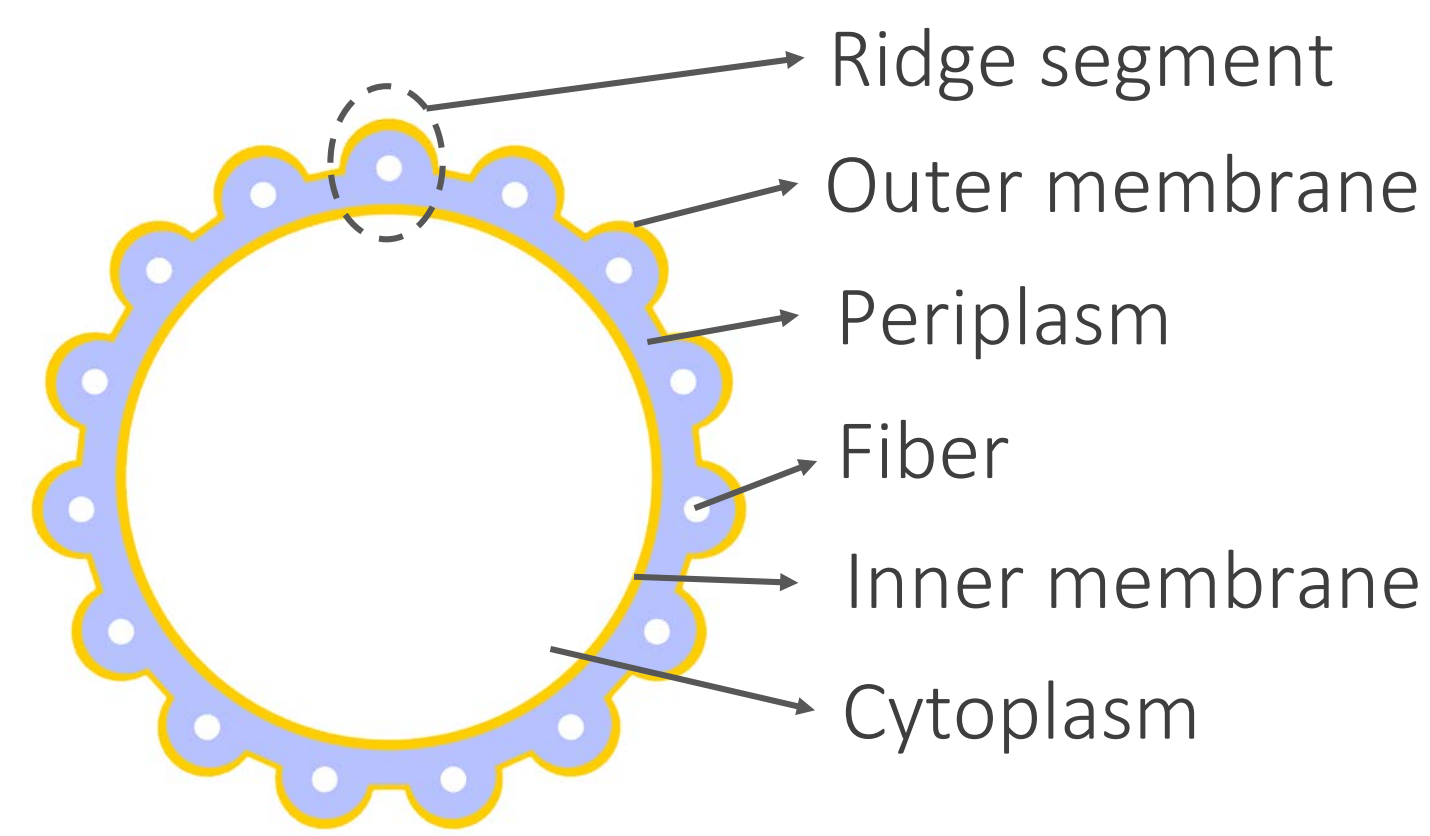
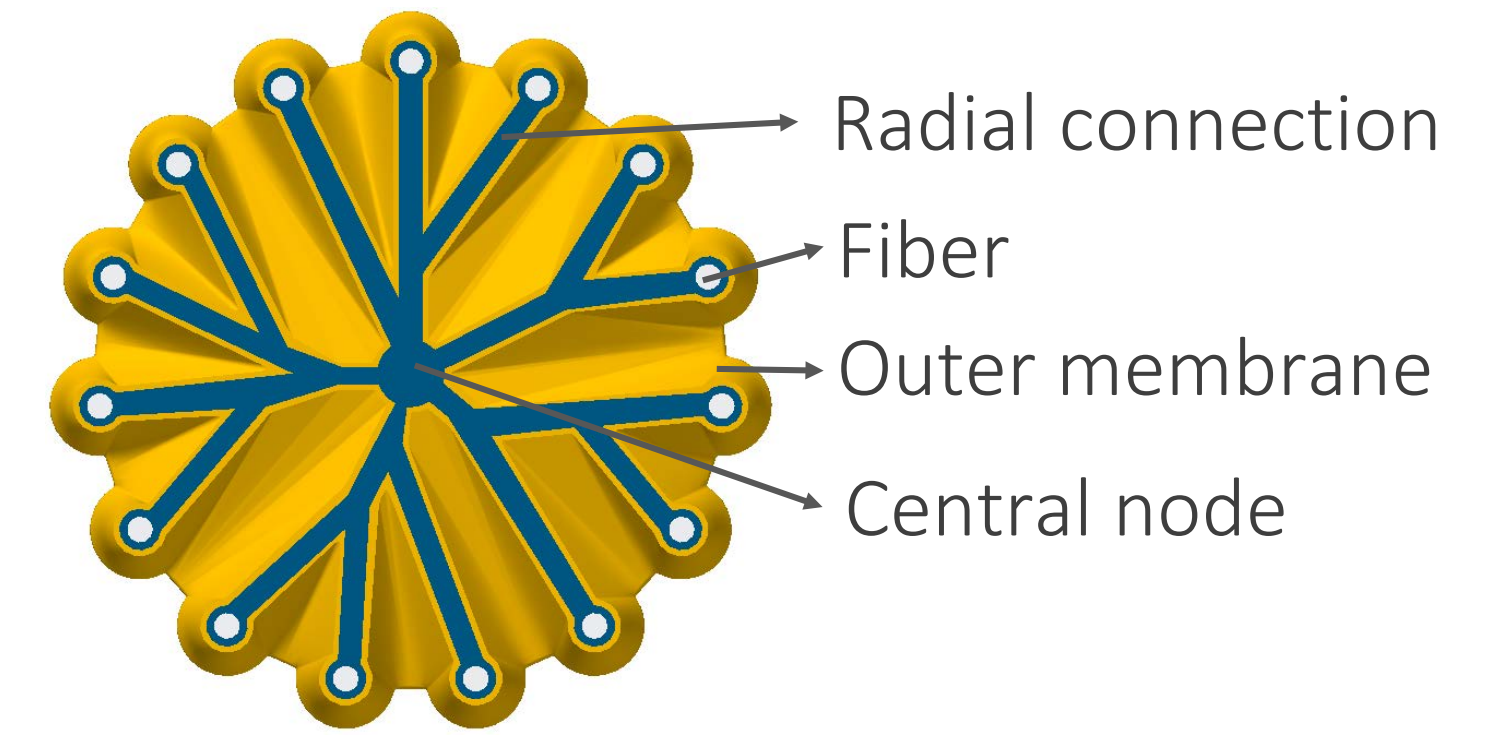


Image courtesy: www.microbial-electricity.eu

Proposed architectural model of cable bacteria

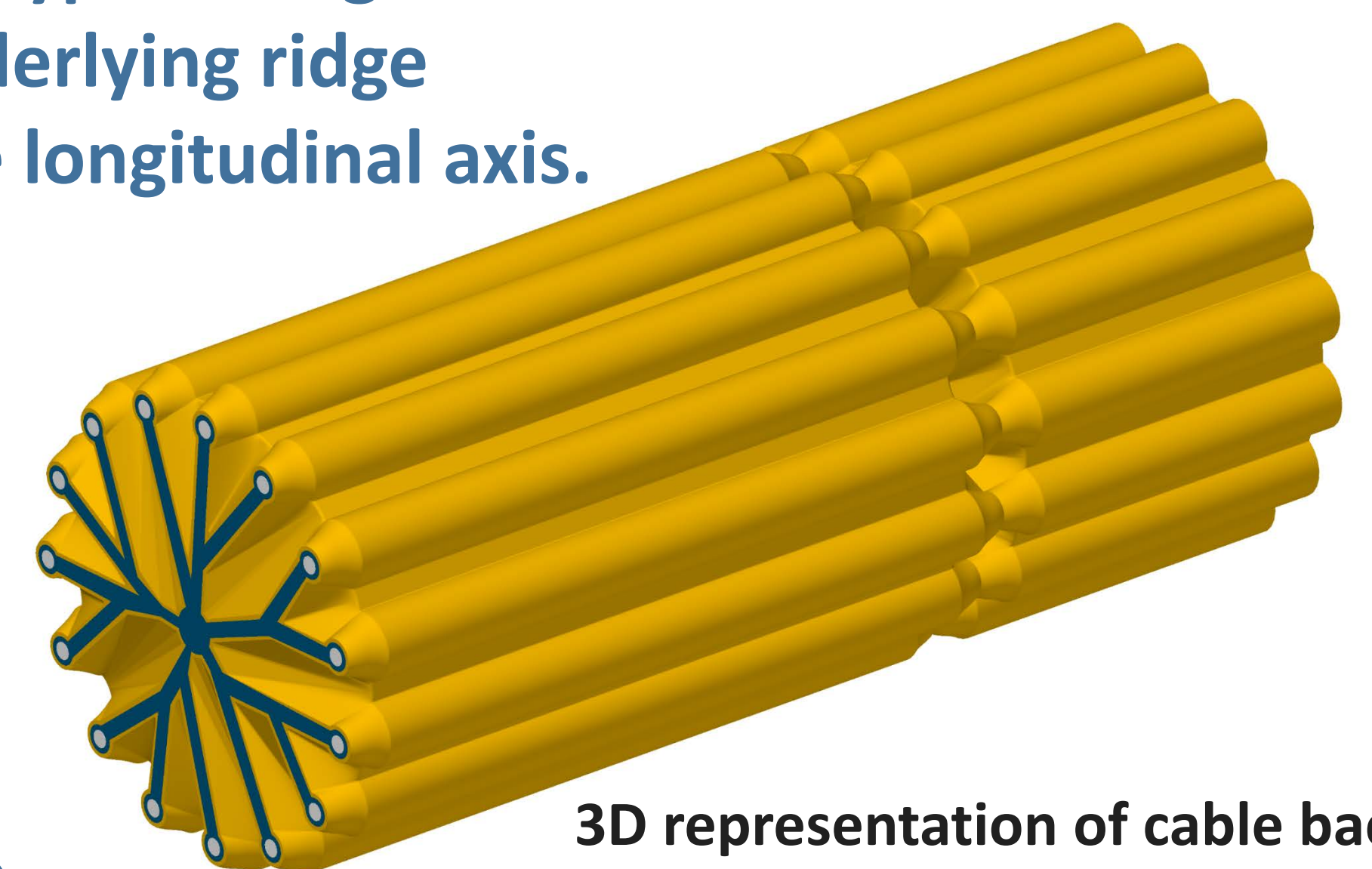


Cross-section at the cell body



Cell junction

We propose that cable bacteria are composed of **one type of ridge segment with underlying ridge structure long the longitudinal axis.**



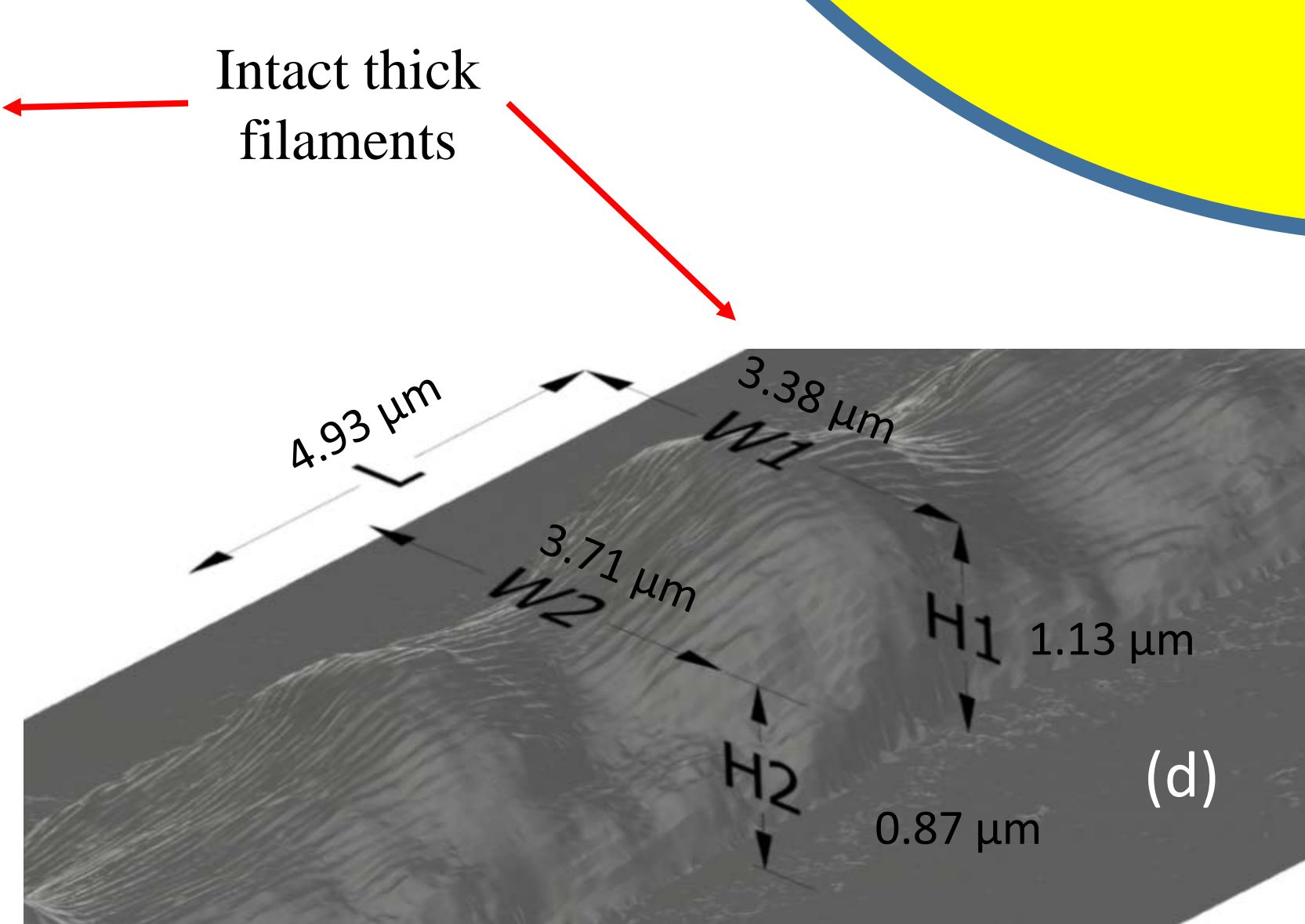
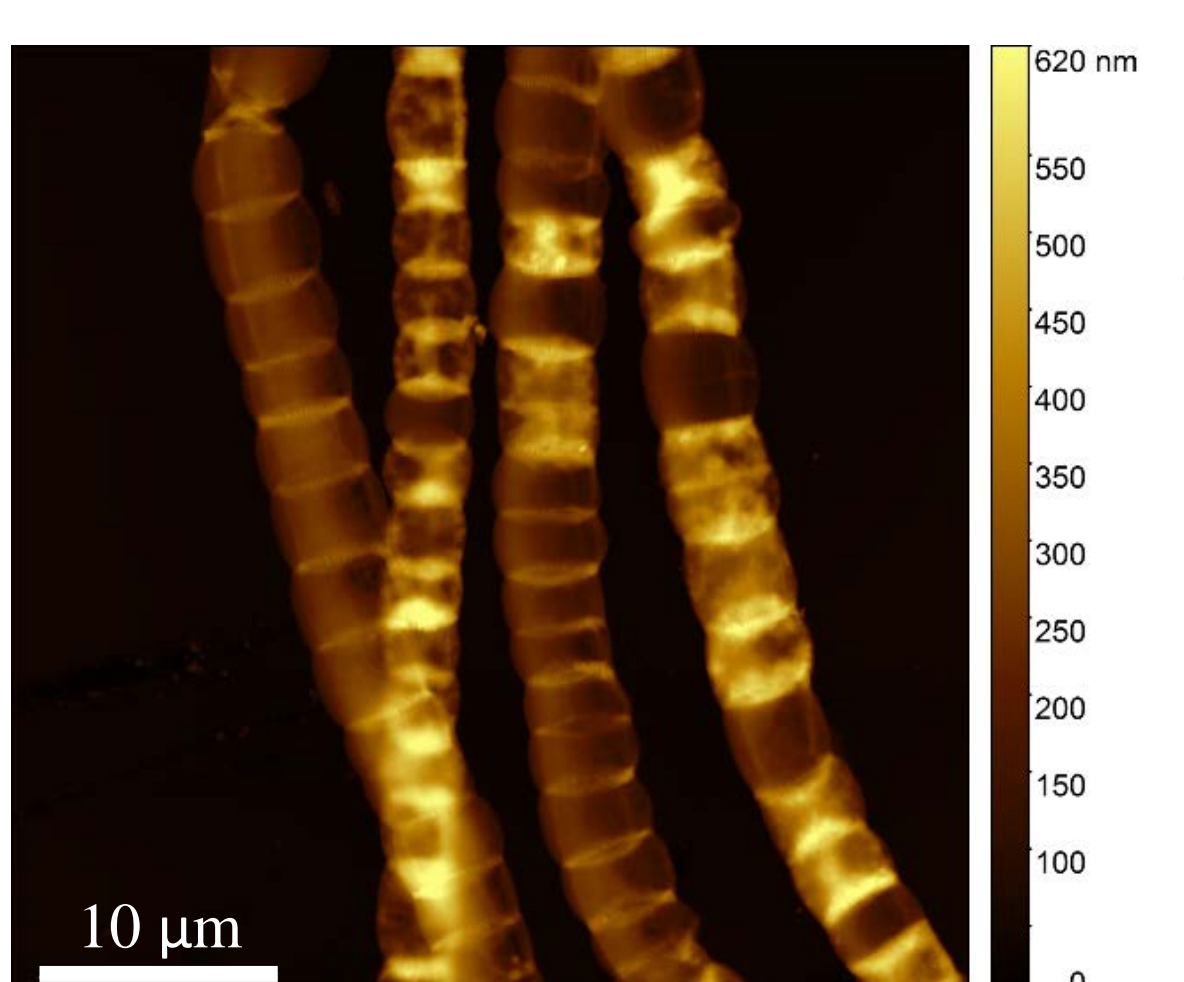
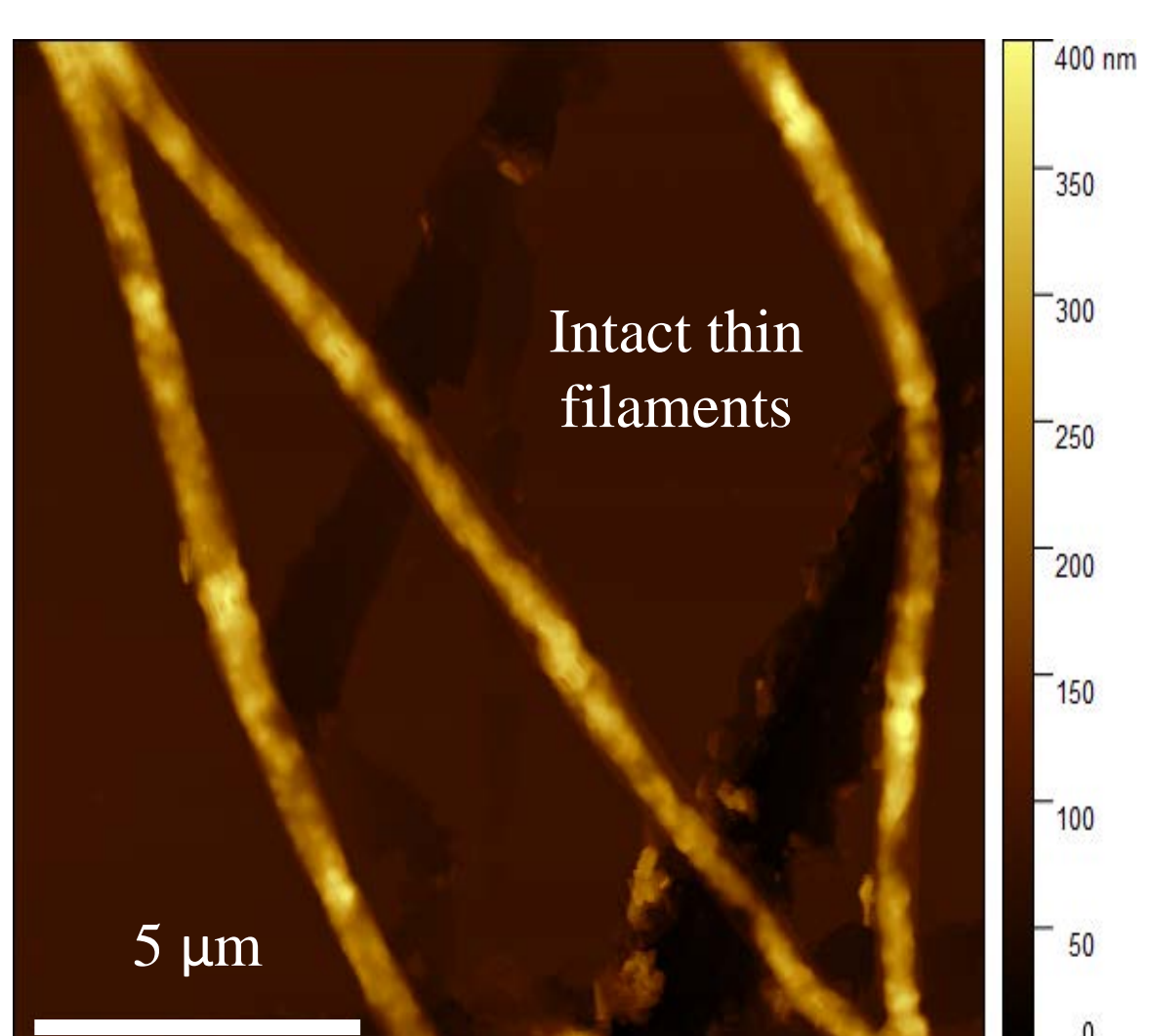
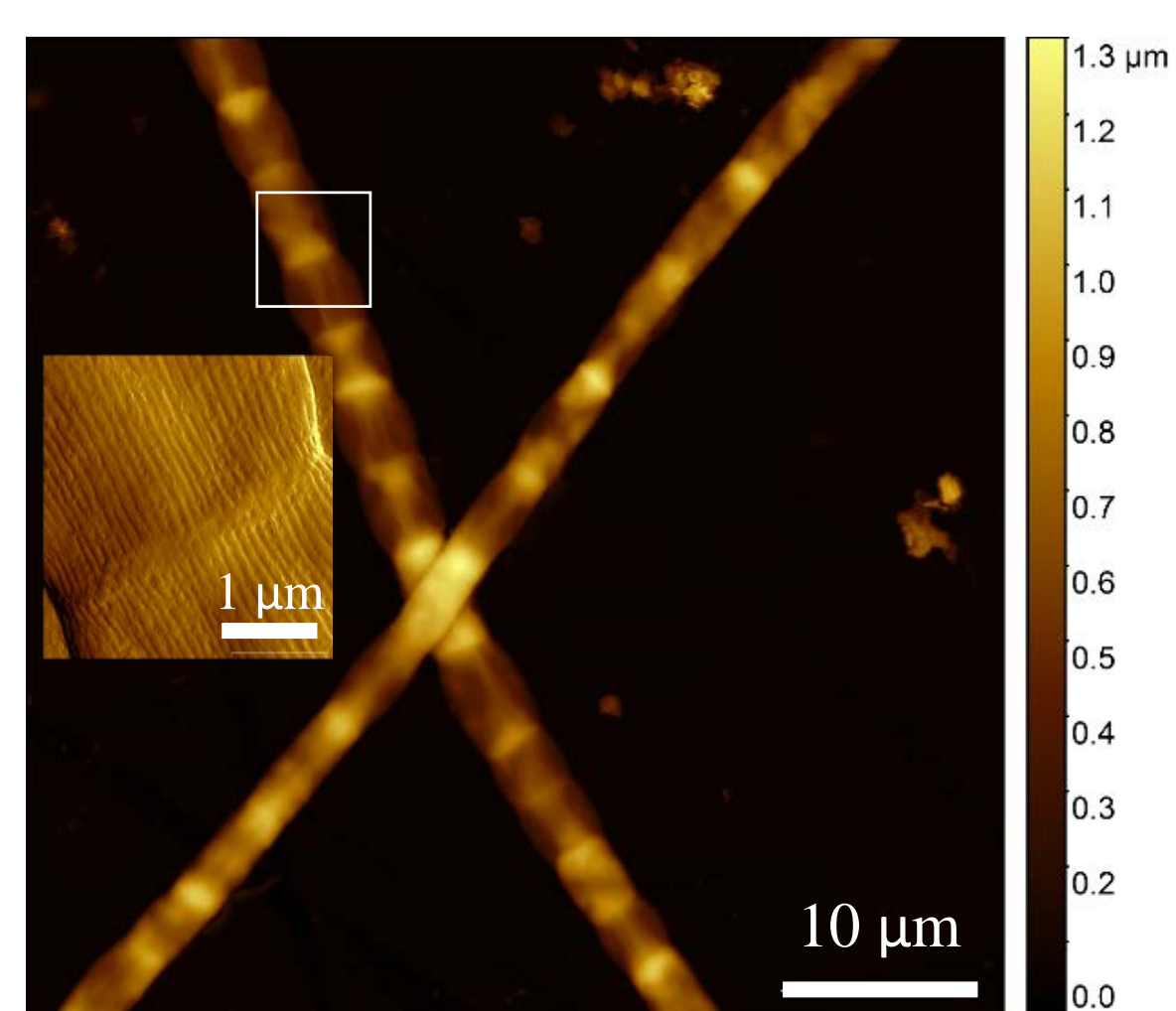
3D representation of cable bacteria

Cartwheel structure

Fiber envelope surrounds the inner cell, converges at the junction.

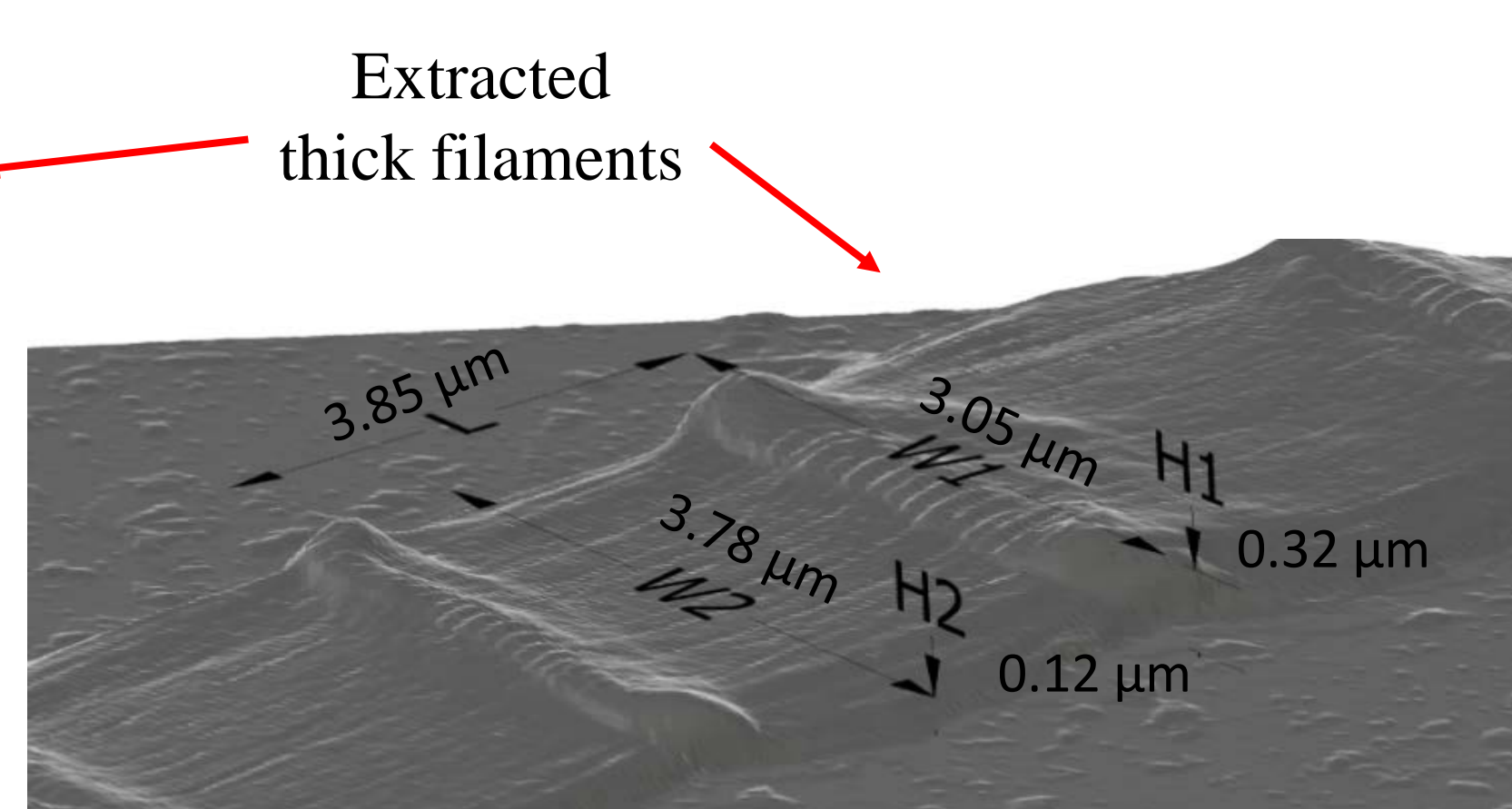
How about growing conductive bacteria as long as 10 cm which can be used as building blocks in bio-electronics!

Surface characterization: AFM

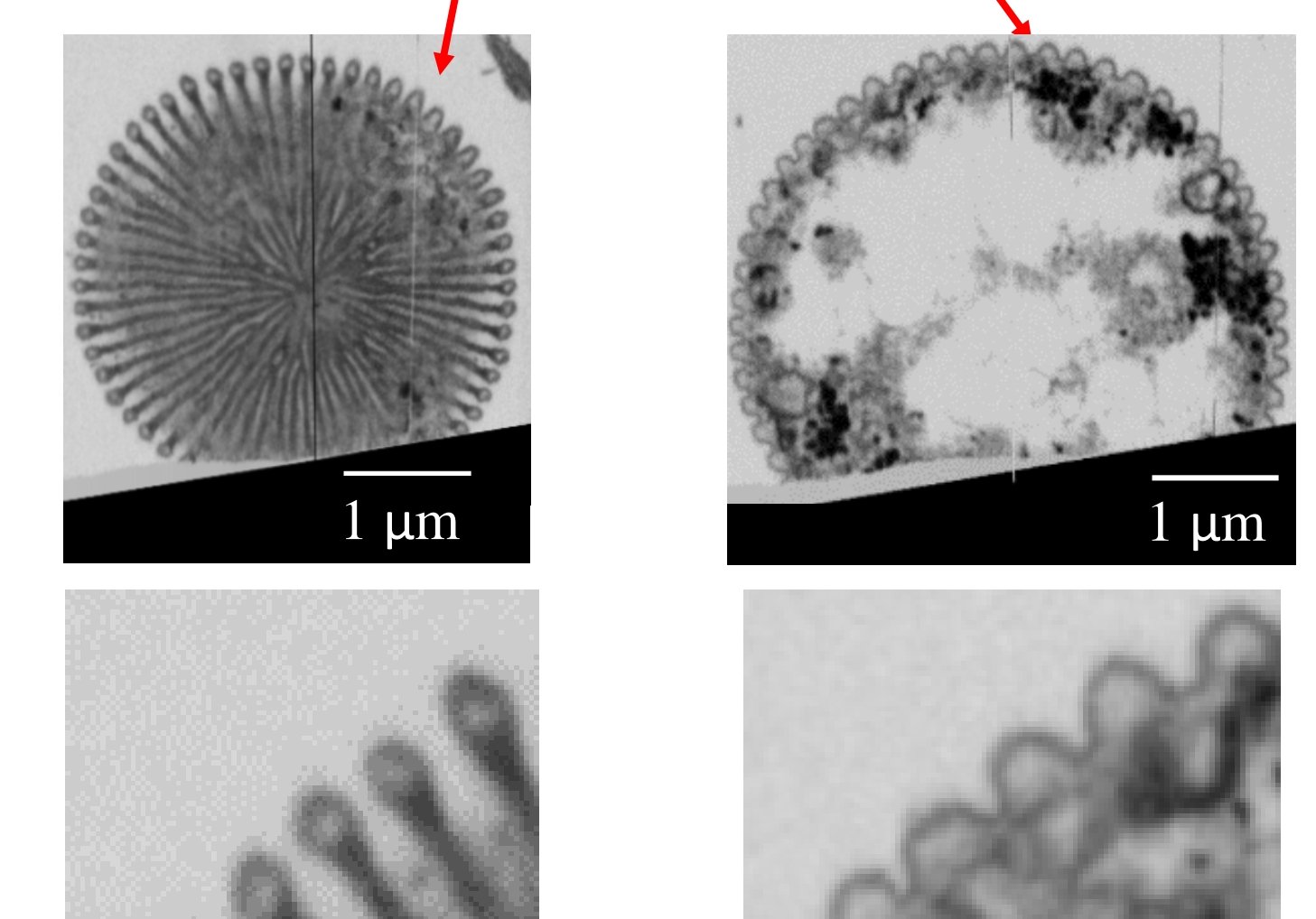
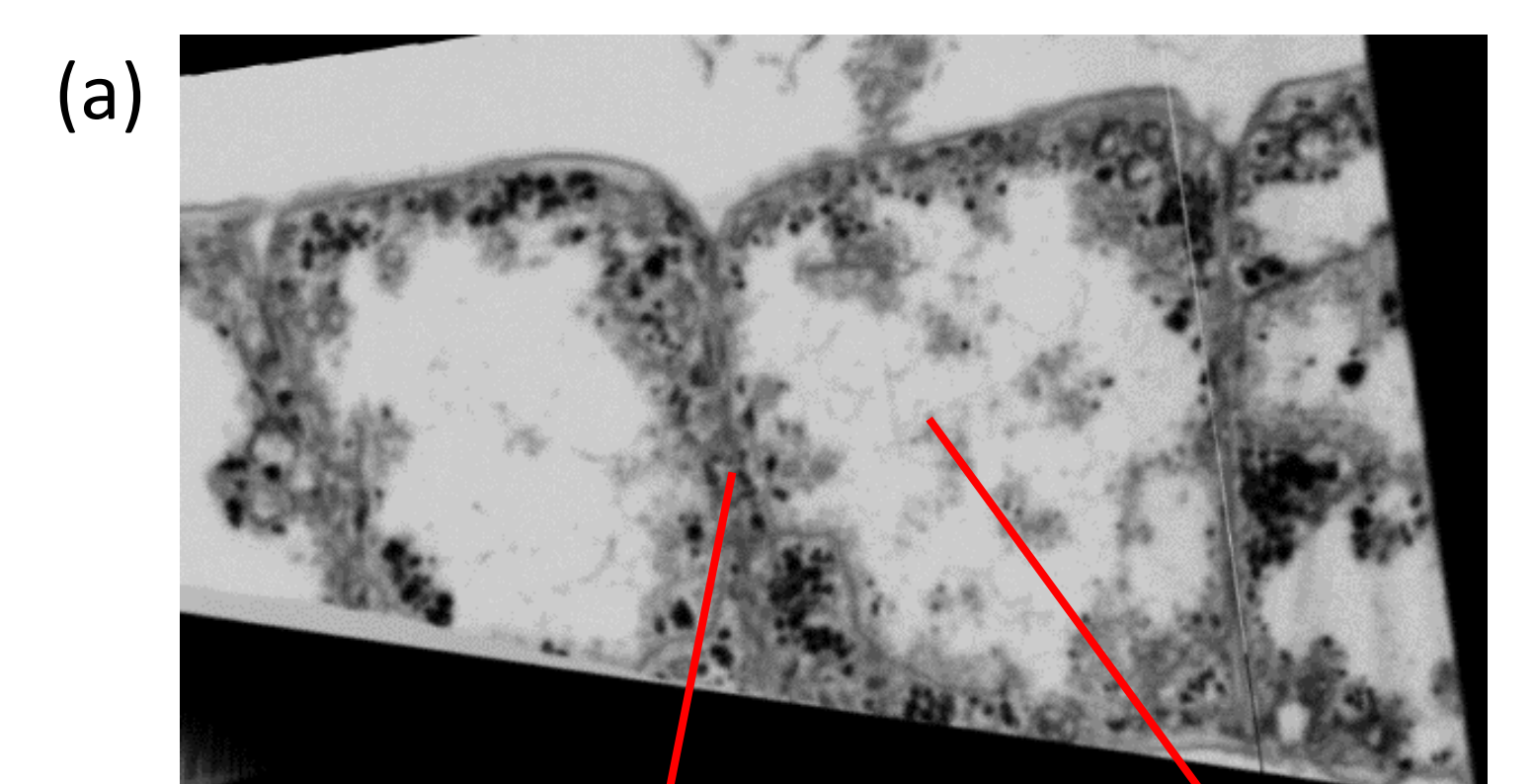


1 Junctions are higher and thinner than the body

2 Cells deflate due in air while drying



Bulk characterization: FIB/SEM?



Nanotomography cross-sections of (a) thick CB (b) thin CB

Filaments maintain their shape due to them being embedded in resin almost immediately after extraction.

Cross-sectional SEM images reveal different constitution within circular structure at the end of the cartwheel structure.

Are these the *conducting fibers*?

