

# Simulation of Bio-medical Waveguide in Mechanical and Optical Fields

Mechanical and Optical Fields

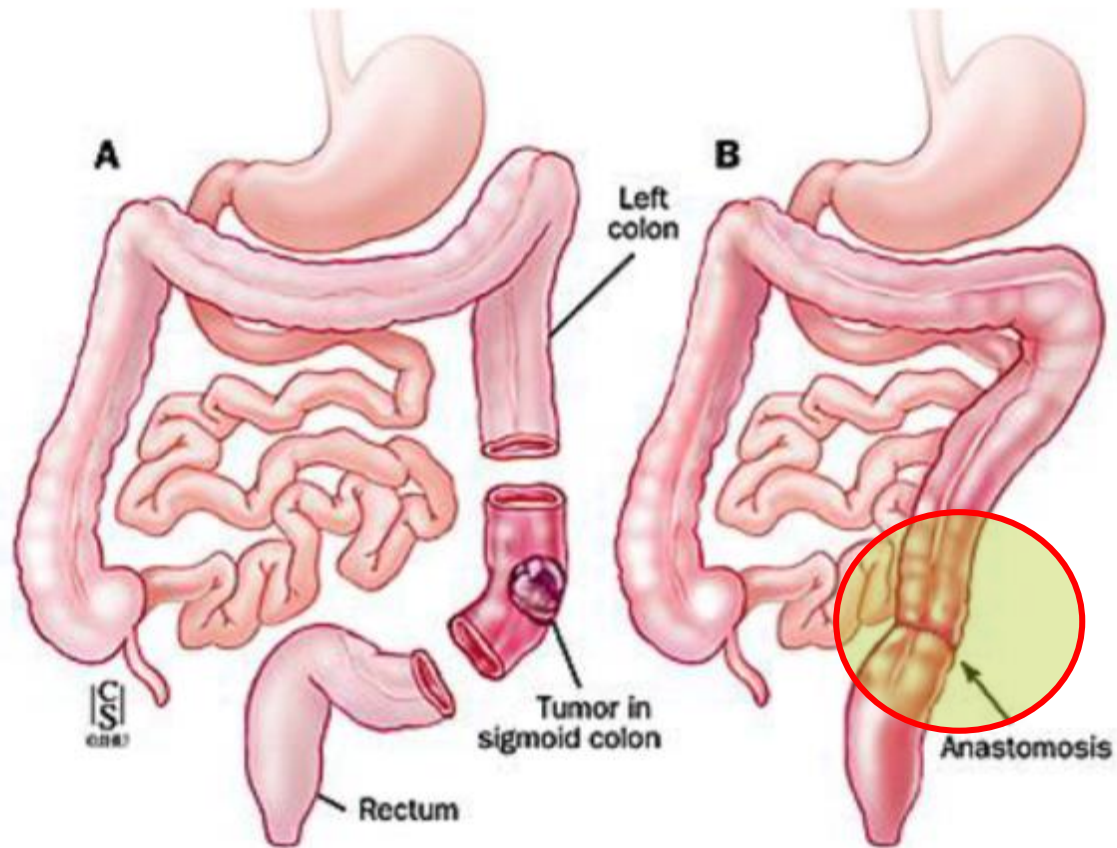
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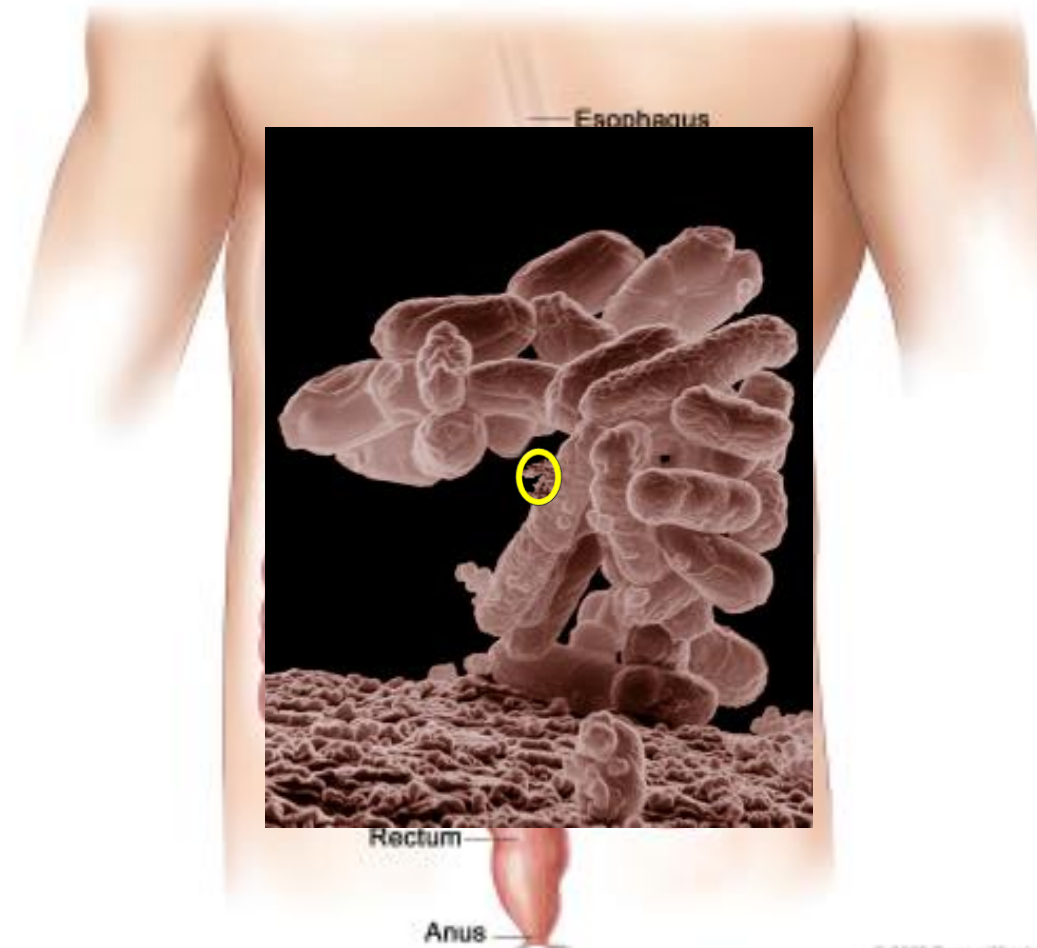
# Outline

- Introduction
- Structural design
- Comsol Simulation
- Conclusion

# Introduction



# Introduction



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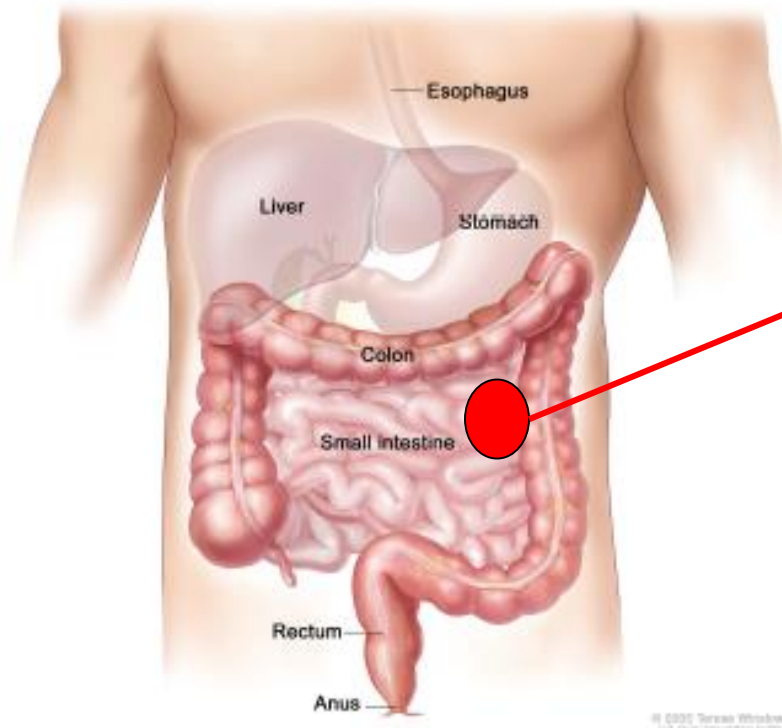
# Introduction

Anastomotic leakage is between 4% and 17 %

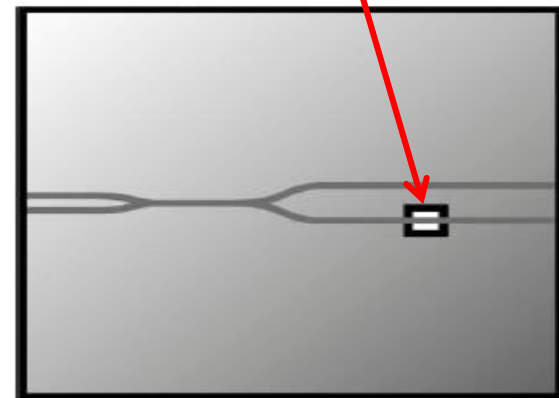
Table : Colonic surgery results

	Without leakage	With leakage
mortality	2.6%	18.6%
Organ failure	1.1%	15.9%

# Introduction



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# Structural Design

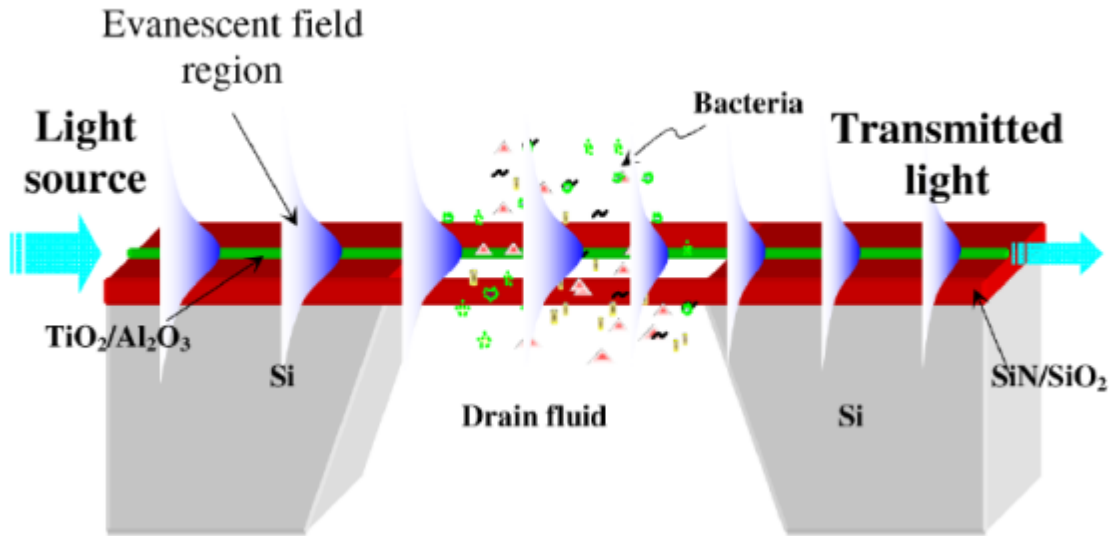


Figure A: Schematic of the freestanding waveguide

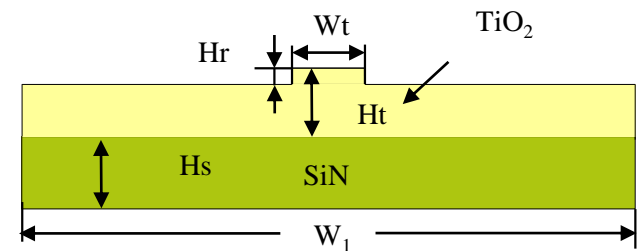


Figure B: Cross section of the freestanding waveguide

# Optical Simulation

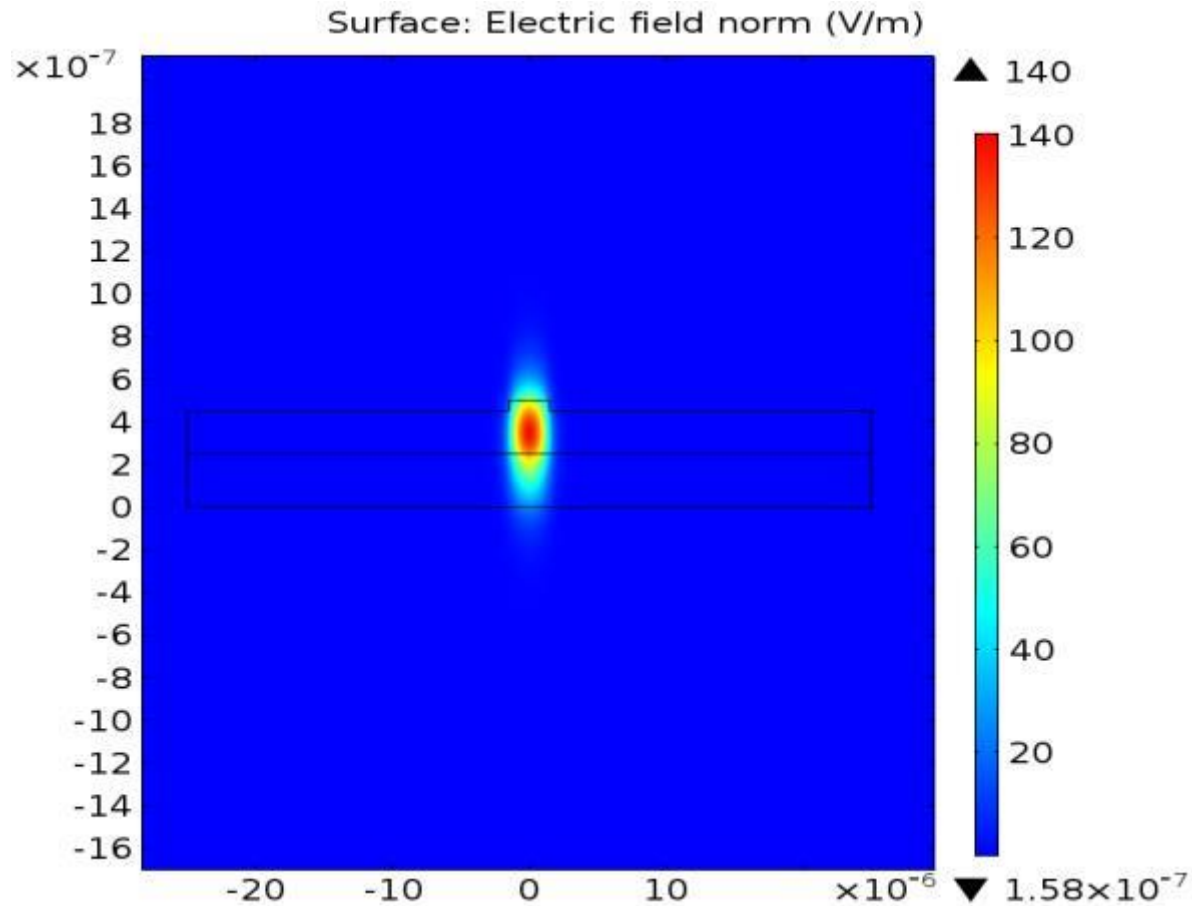


Figure: Optical simulation on the cross section of the waveguide



# Mechanical Simulation

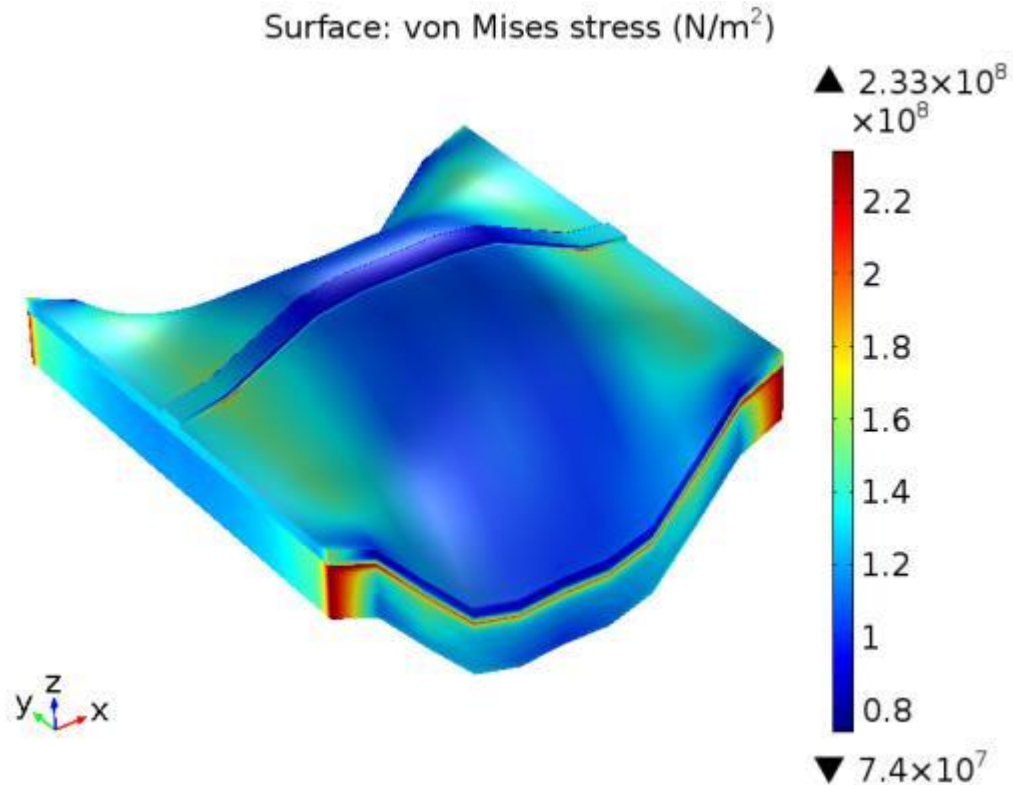
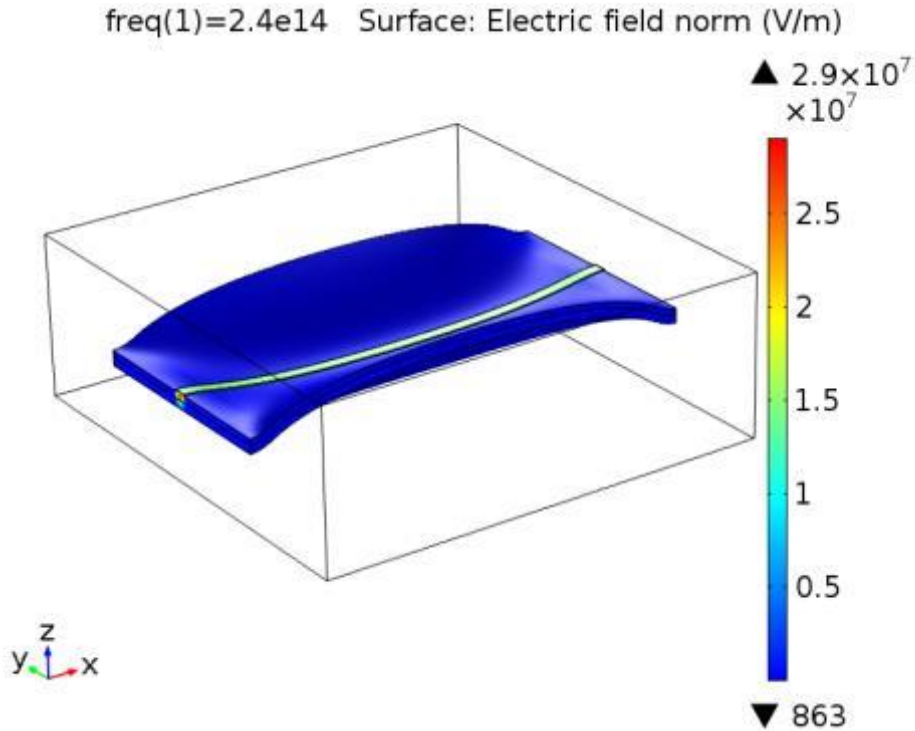


Figure: Structural stress induced by material inner stress

# Multi-physics Simulation



- Moving mesh

▲  Moving Mesh (*ale*)

Only 0.04% of energy is lost due to the stress-induced deformation

Figure: Combination of optical and mechanical simulation

# Conclusion:

- Optical simulations indicate the evanescent wave is suitable for bio-medical application.
- Mechanical simulations show the mechanical stability of the waveguide.
- Multi-physics simulations demonstrate the feasibility of the free-standing optical waveguide.
- Based on these simulations, new devices will be designed and fabricated.

# QUESTIONS?

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## Thank you!