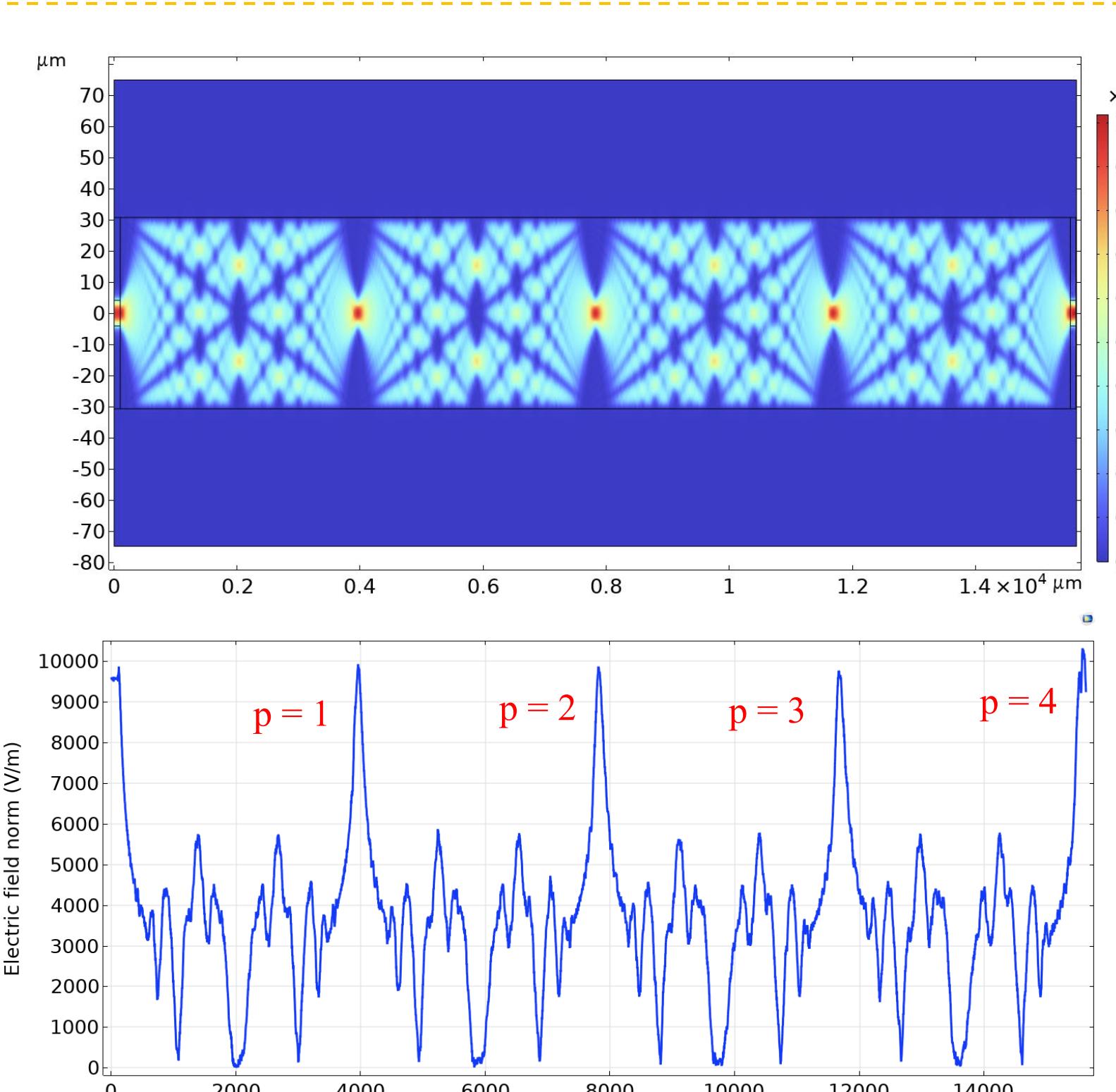
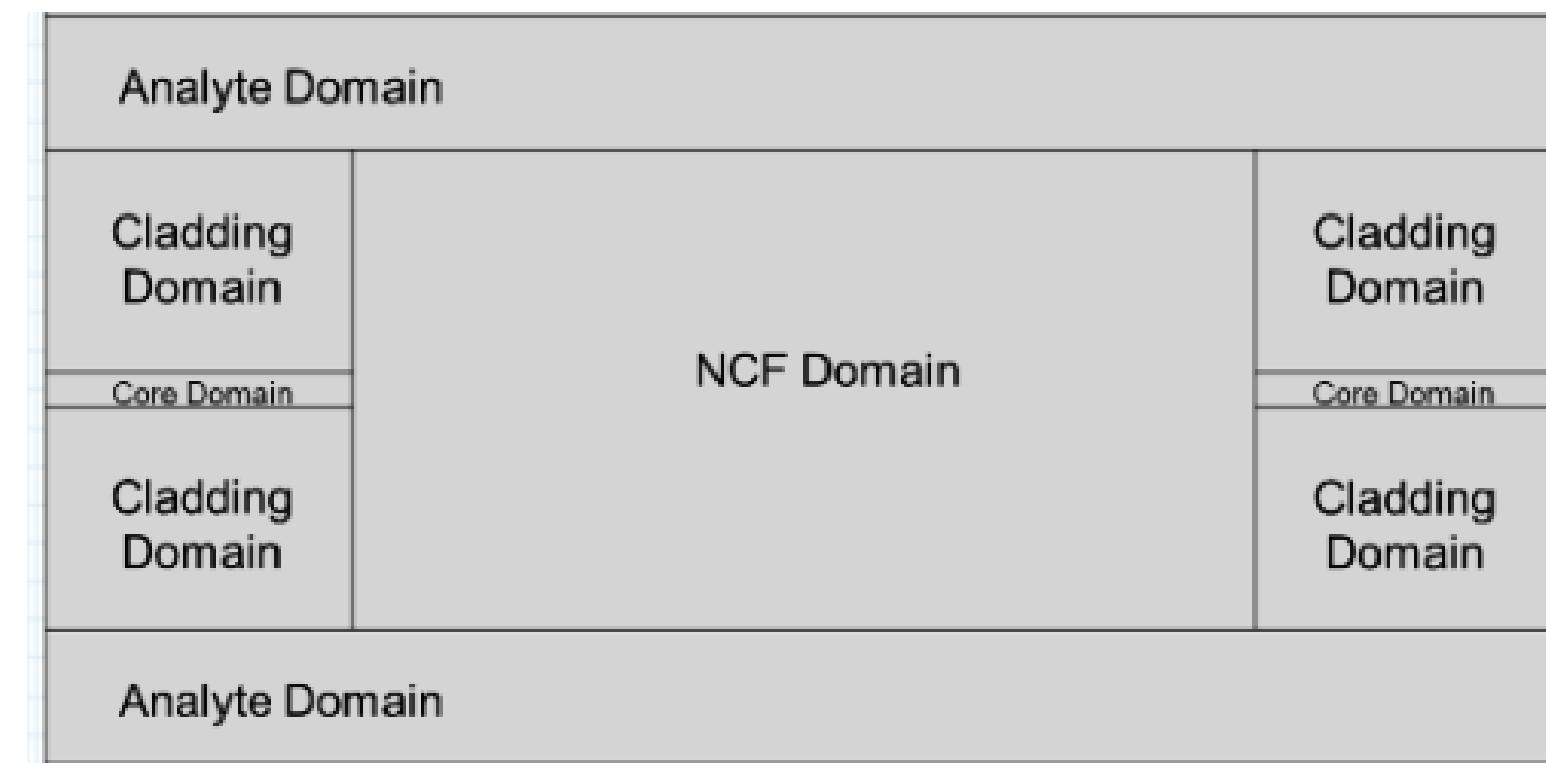


Simulation of fiber optic Multimode Interferometer with COMSOL Multiphysics and its Application

Tulika Khanikar, Dolendra Karki, Yang-Duan Su and Paul Ohodnicki.

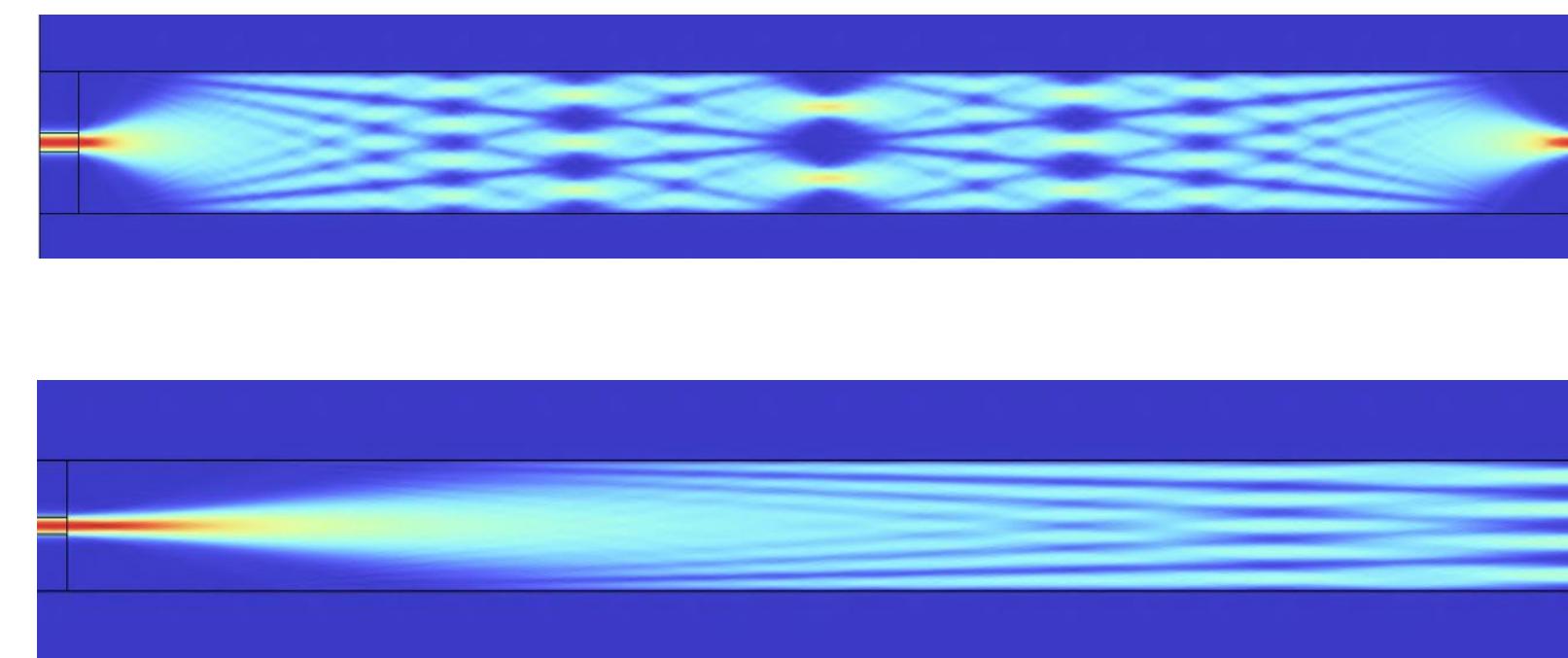
Department of Mechanical Engineering and Materials Science, University of Pittsburgh, PA, USA.



COMSOL version 6.1
Module : Wave optics
Domain : Electromagnetic Waves, Beam Envelopes (ewbe)

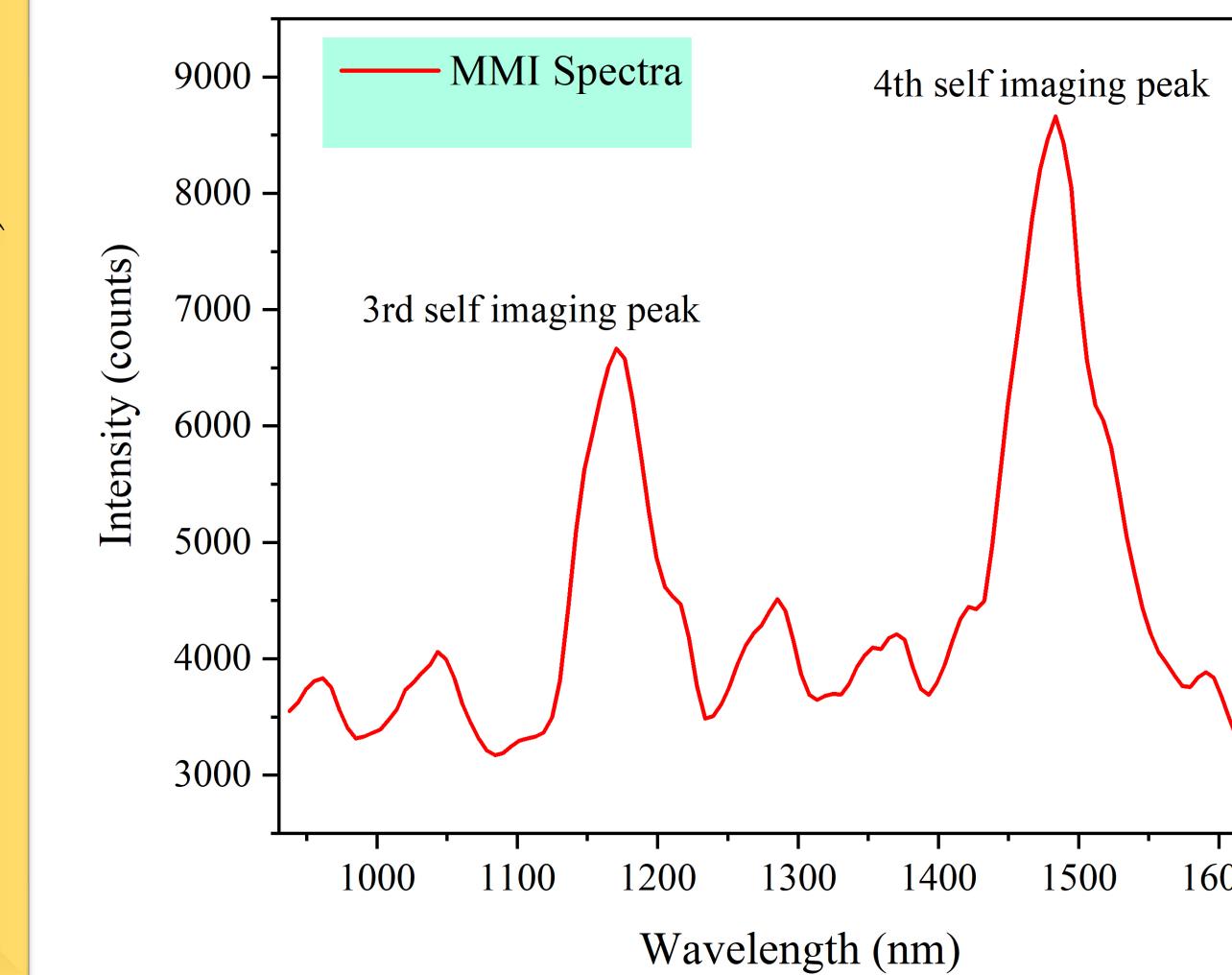
$$L_{MMF} = P \frac{n_1 D_{MMF}^2}{\lambda}$$

n_1 is the RI of core,
 D_{MMF} is the diameter of MMF,
 L_{MMF} is the MMF length,
 $P = 1, 2, 3, \dots$ is an integer, representing the self-image order.

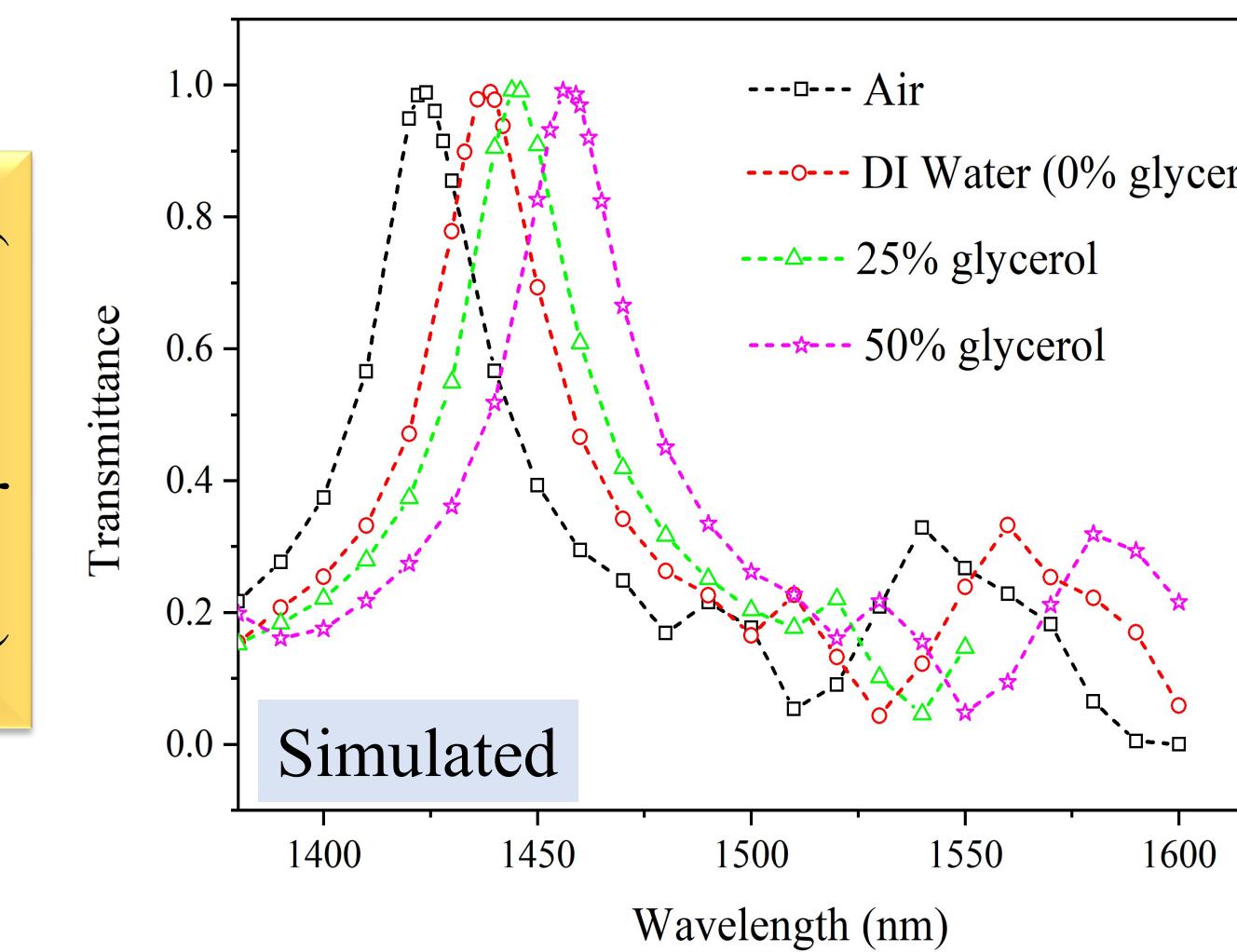


- When light is coupled from a SMF to a MMF/NCF, the modes that are supported by the MMF/NCF are excited and interfere with each other giving rise to an interference pattern along the MMF/NCF.
- At a certain length, light interferes constructively along the MMF/NCF central axis forming replicas of the input light field (self-image).
- If another SMF is connected to the MMF/NCF at the self-image point, multimode interference (MMI) information can be obtained.
- The self-imaging peaks are dependent on refractive index, wavelength, length and diameter of the MMF/NCF.

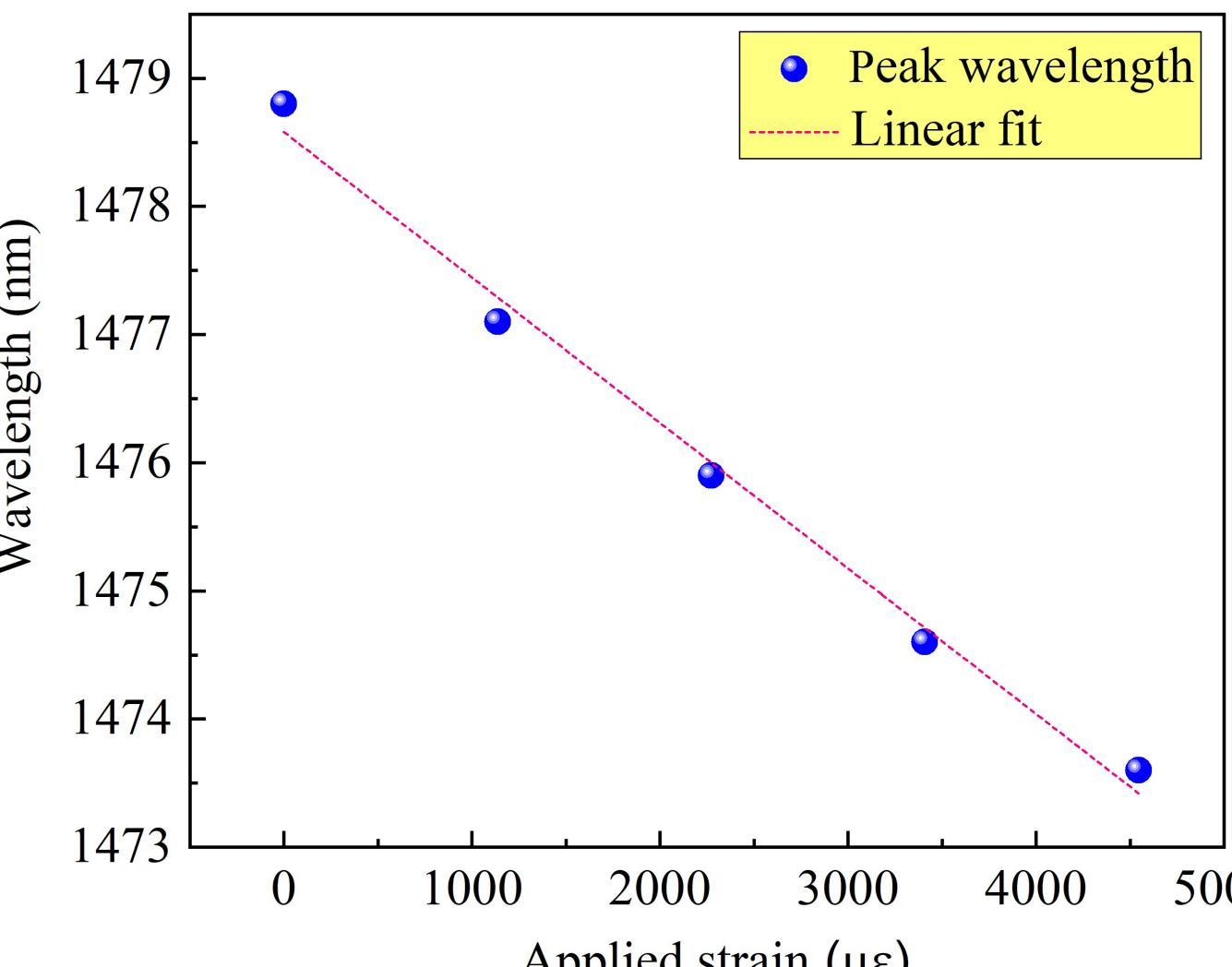
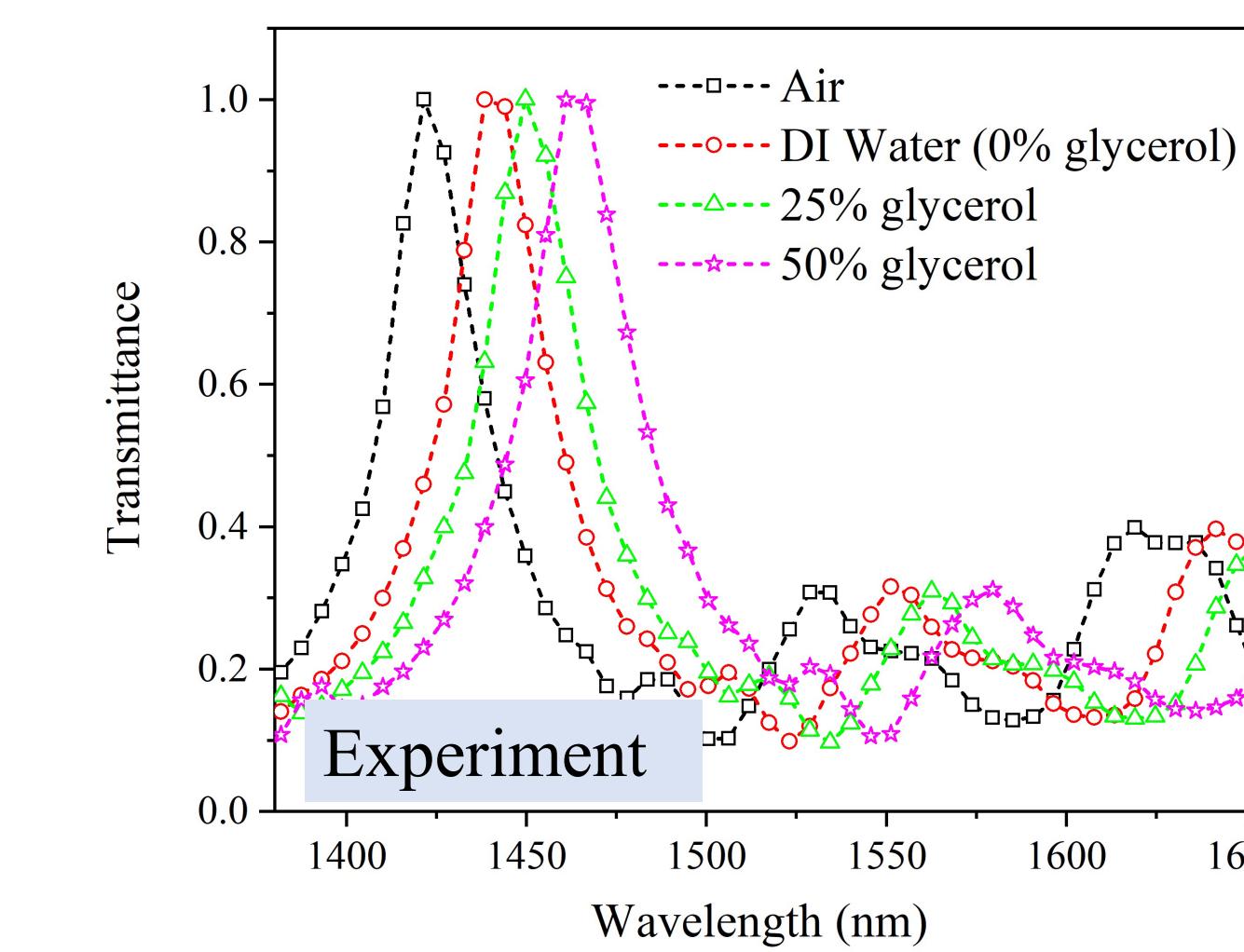
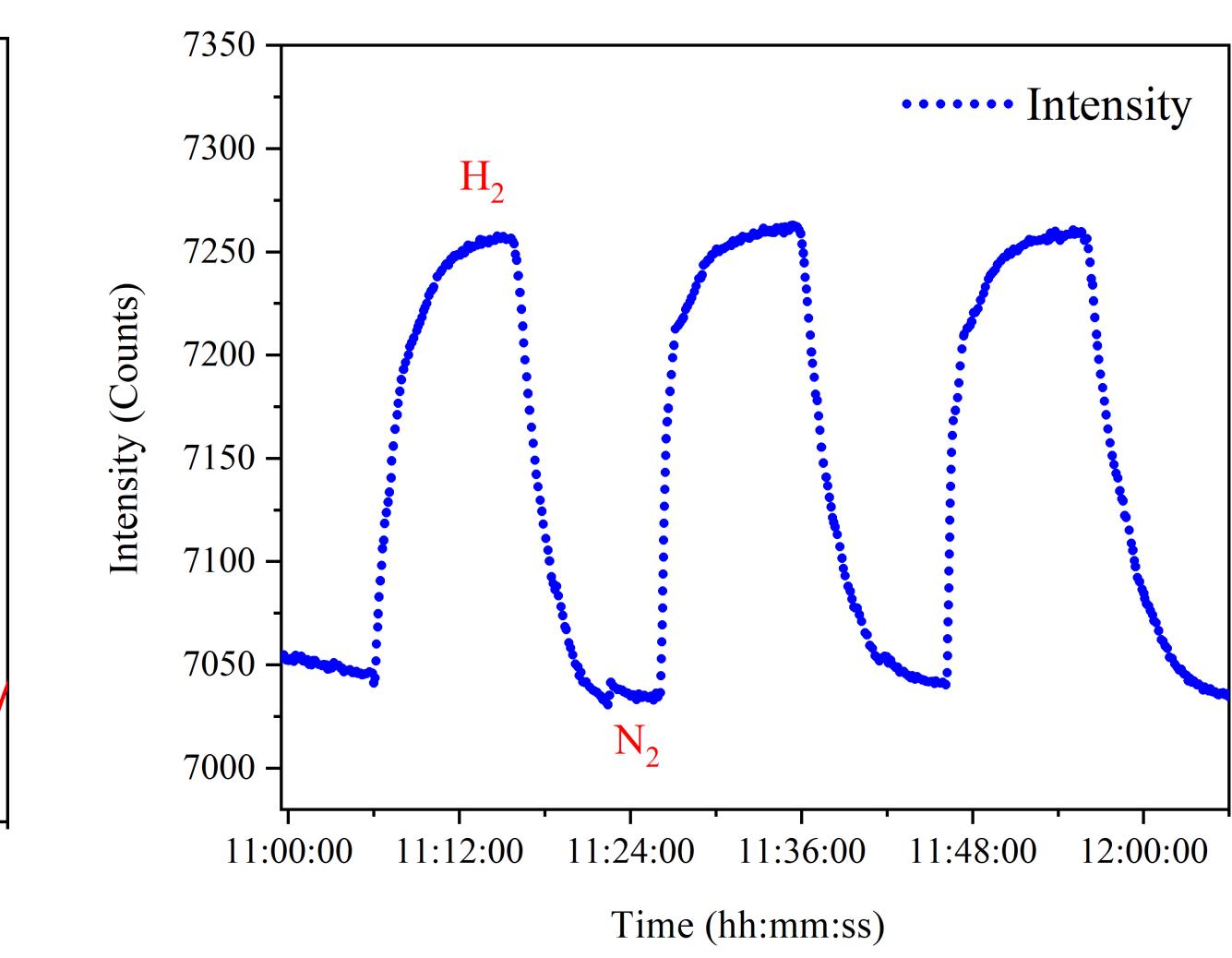
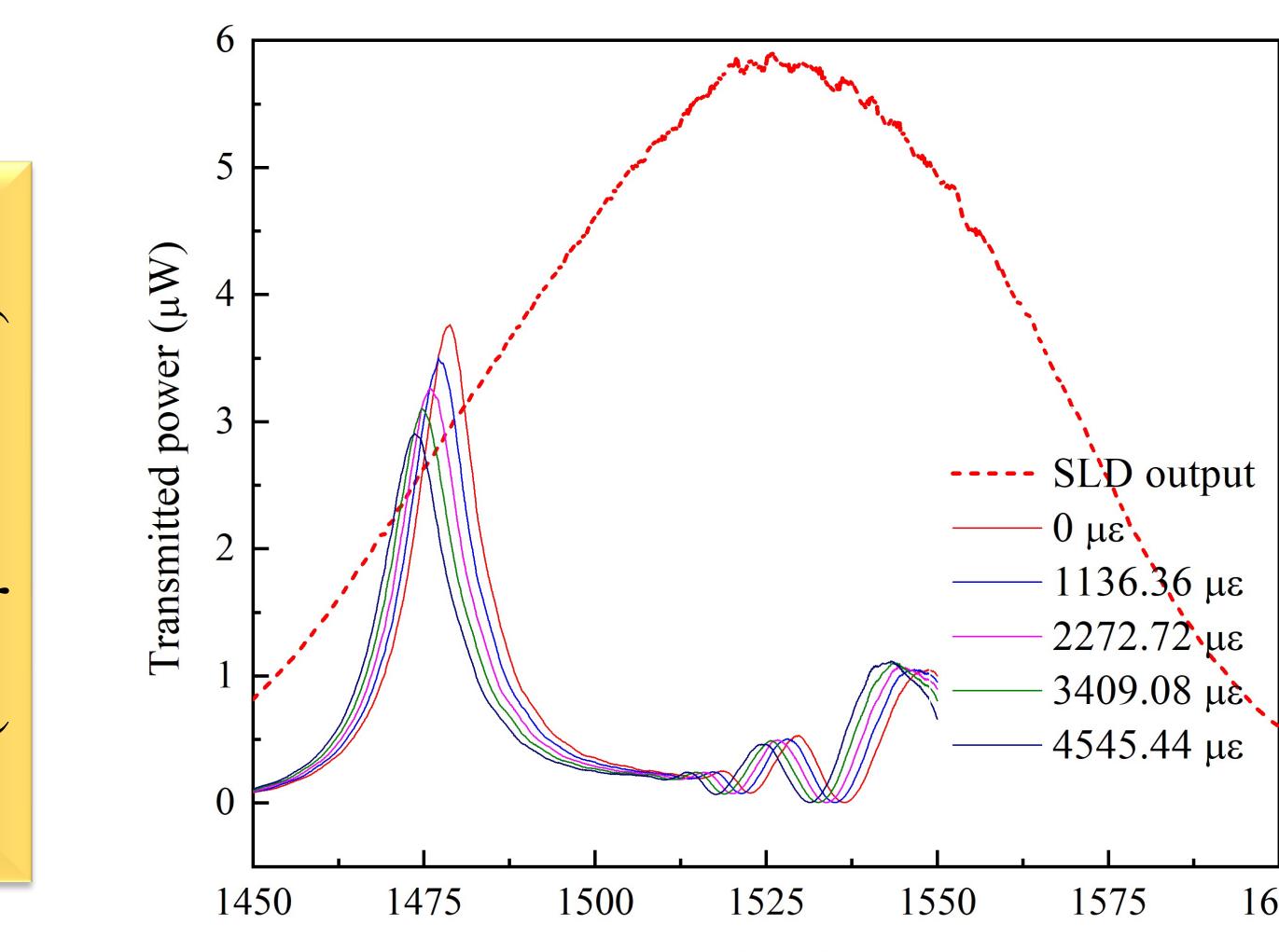
H₂
Sensing
(80 μm NCF coated with 5nm Ti+50 nm Pd)



RI
Sensing
(61.5 μm NCF)



Axial strain
Sensing
(105 μm MMF)



Acknowledgement

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