Introduction of FBG

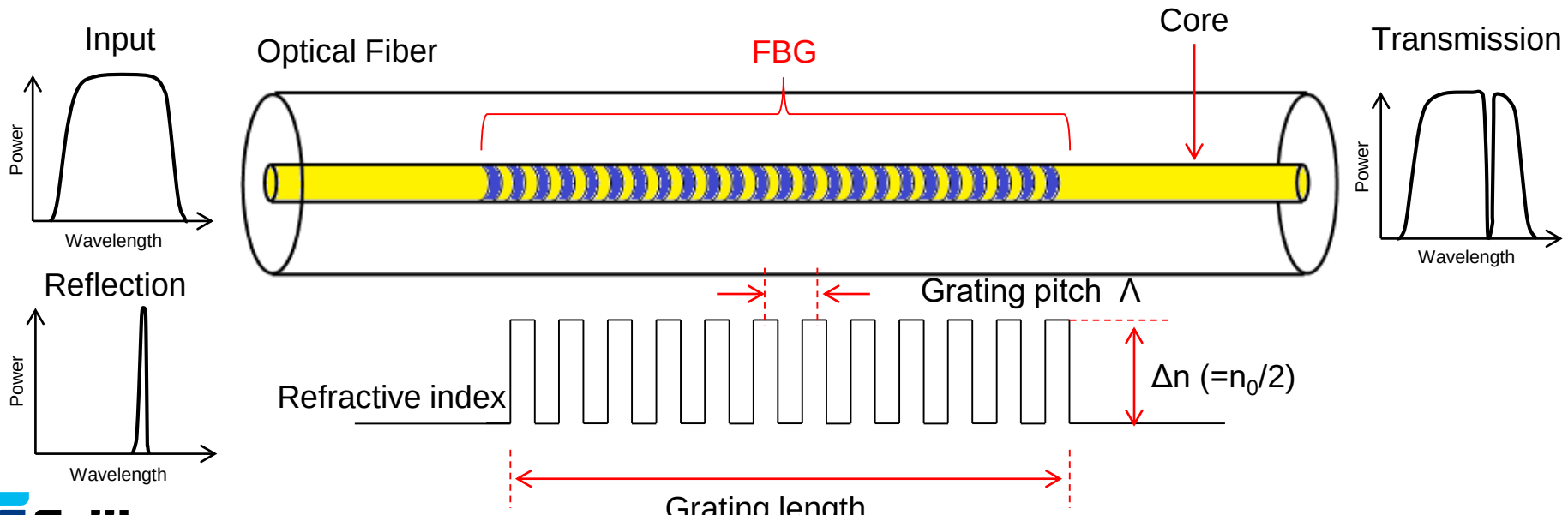
Contact information for technical matters
Fujikura Ltd.
http://www.fujikura.co.jp/eng/
E-mail: optodevice@jp.fujikura.com

Contents

- Basics
  - Fiber Bragg Grating (FBG)
  - Merits of FBG
  - Manufacturing method of FBG
- Applications
  - Wavelength stabilizer for pump LD
  - Resonator for fiber laser
  - Wavelength filter
  - Typical specification
- Summary

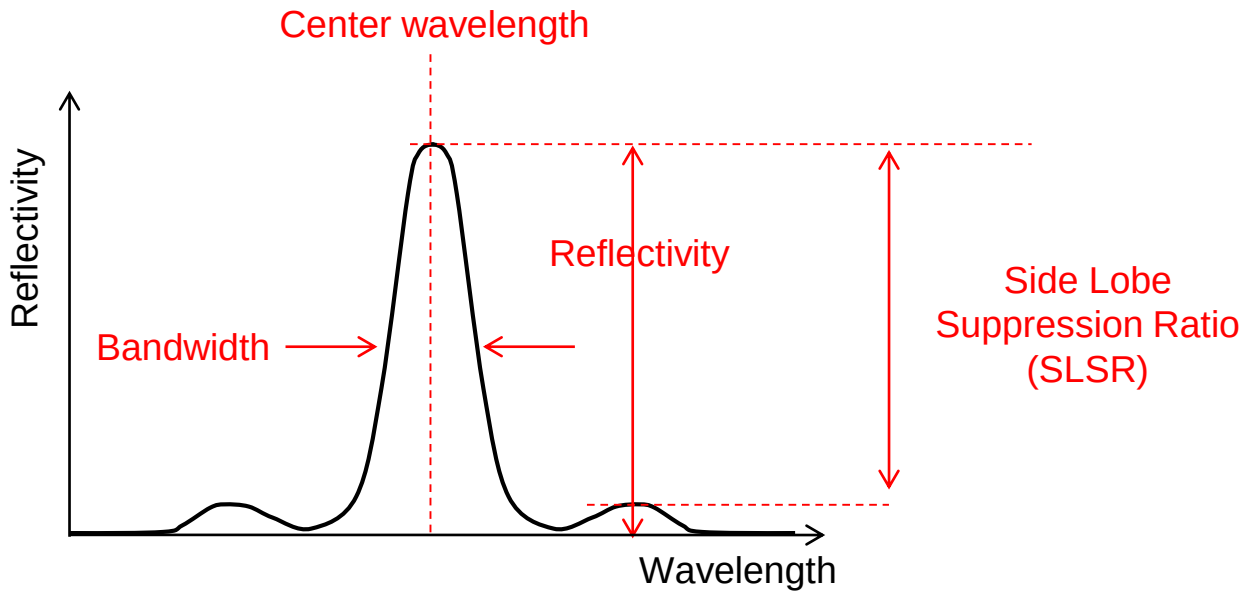
Fiber Bragg Grating

- Fiber Bragg Grating (FBG)
  - Periodical refractive-index change (Grating) is manufactured in the Ge-doped core
  - This grating reflects only specified wavelength λ_C correlated with grating pitch Λ ($\lambda_C=2n_0\Lambda$)
  - Reflection and transmission properties are determined by grating pitch, refractive-index change, and grating length.



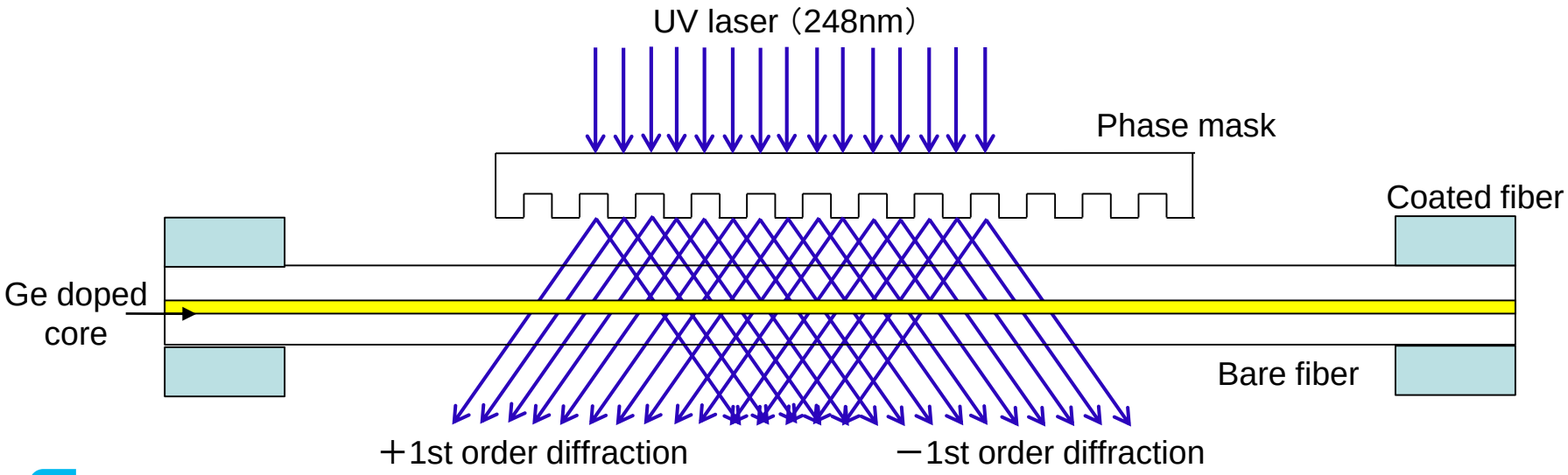
Merits of FBG

- Merits of FBG
  - Better wavelength selectivity than dielectric multilayer filter
  - Reflection spectrum can be controlled by refractive-index distribution



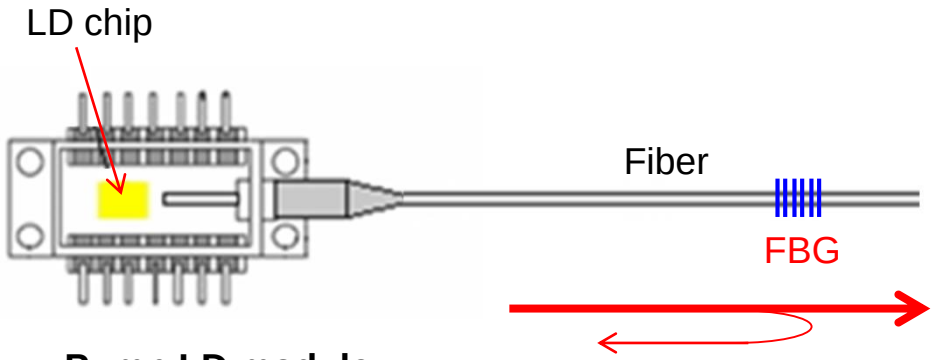
Manufacturing method of FBG

- Phase mask method
  - Ultraviolet laser light causes refractive-index change on Ge-doped core
  - By using phase mask, periodical interference pattern can be formed by 1st and -1st order diffraction light.
  - Phase mask methods has good reproducibility of interference pattern. Therefore this is suitable for mass production)

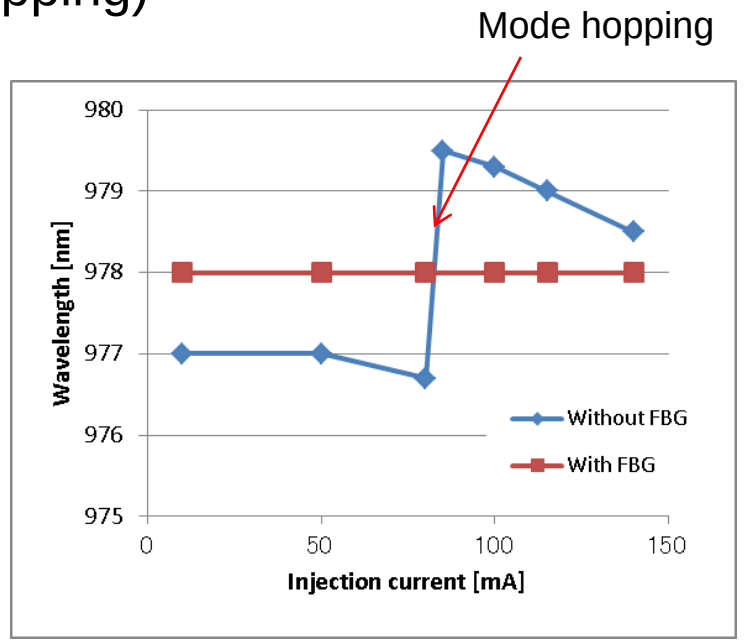


Wavelength stabilizer for pump LD

- Features
  - Wavelength stabilization for laser diode for excited light (= pump LD)
  - By using FBG, we can suppress drastic wavelength change with increasing injection current(=mode hopping)



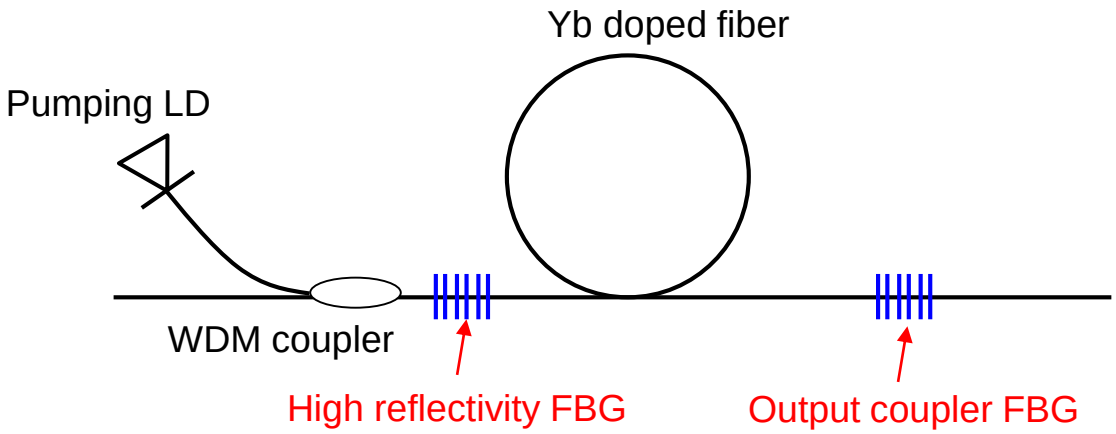
Pump LD module



Laser emission wavelength

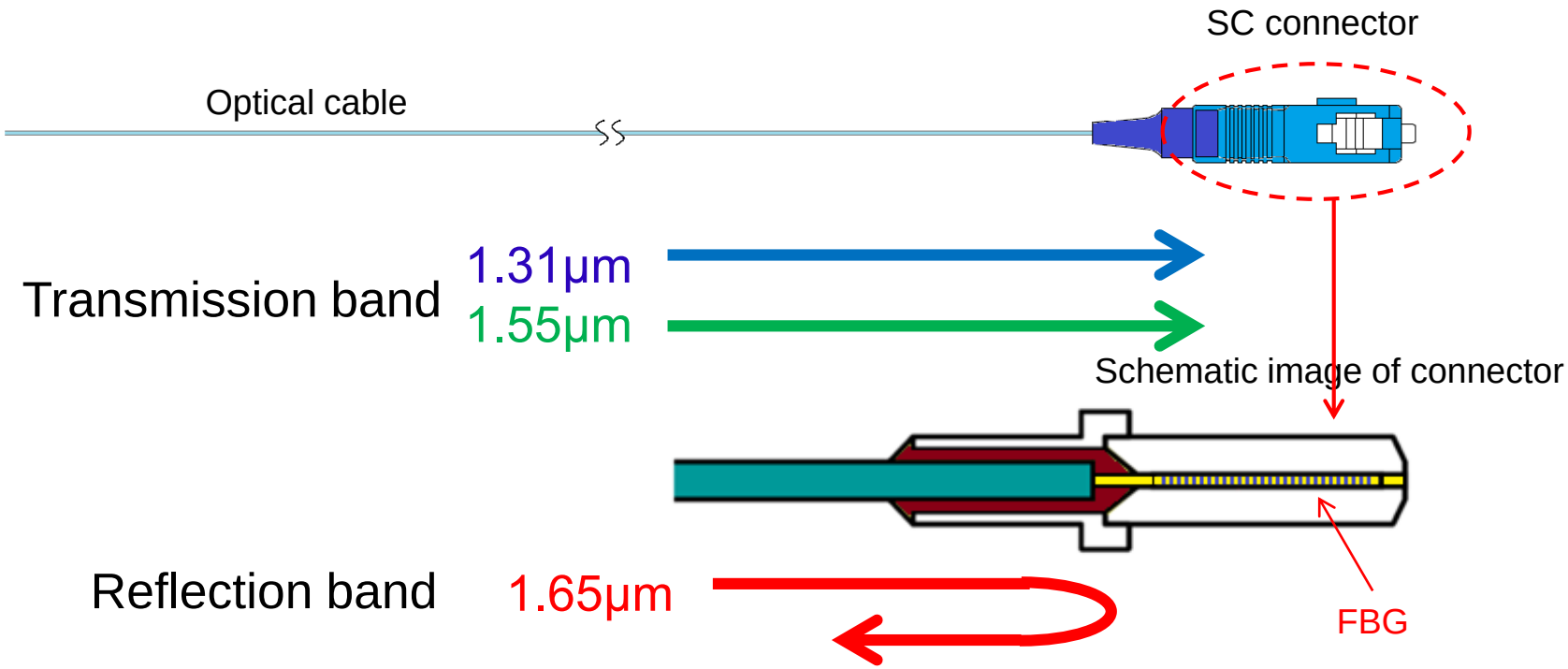
Resonator for fiber laser

- Features
  - In the fiber laser systems, FBGs are used as a resonator.



Wavelength filter

- Features
  - Optical pigtail with a built-in FBG reflector
  - By using 1650nm-band light, obstruction in the optical path can be detected by reflection intensity



Typical specification

- Wavelength stabilizer for pump LD

No.	Item	Typical specification
①	Fiber	SMF、PMF（PANDA）
②	Center wavelength	980nm ,1400nm
③	Bandwidth	0.3 to 3.0nm *1
④	Reflectivity	1 to 10% *1

*1 Customizable parameter

- Wavelength filter

No.	Item	Typical specification
①	Fiber	SMF、PMF（PANDA）
②	Center wavelength	1650nm *2
③	Bandwidth	5 to 15nm *2
④	Transmissivity	-20dB *2
⑤	Connector	SC

*2 Customizable parameter

Summary

Features of Fujikura FBG

- We can realize optimized optical properties by using optical design and production technology.

- Superior uniformity is realized by high-accuracy process control and the measurement technology.

- Fujikura can supply various FBG optimized for customer requests.

Fujikura is challenging for customer solutions to meet various needs.