

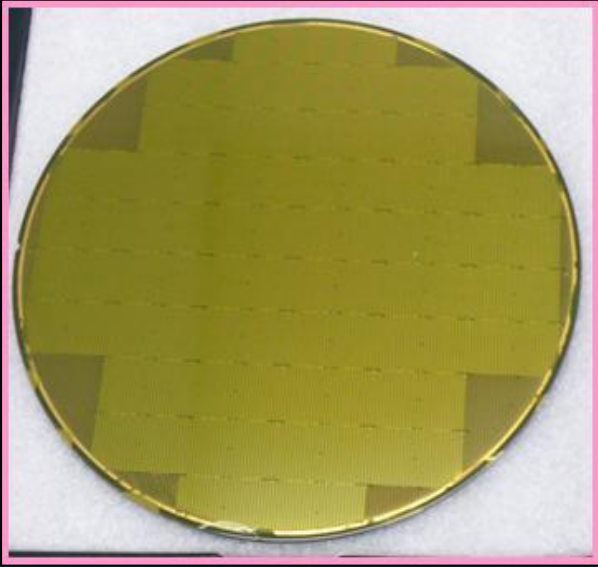


30 ปี เทคโนโลยีแสง มุ่งสู่อุตสาหกรรมไทย 4.0

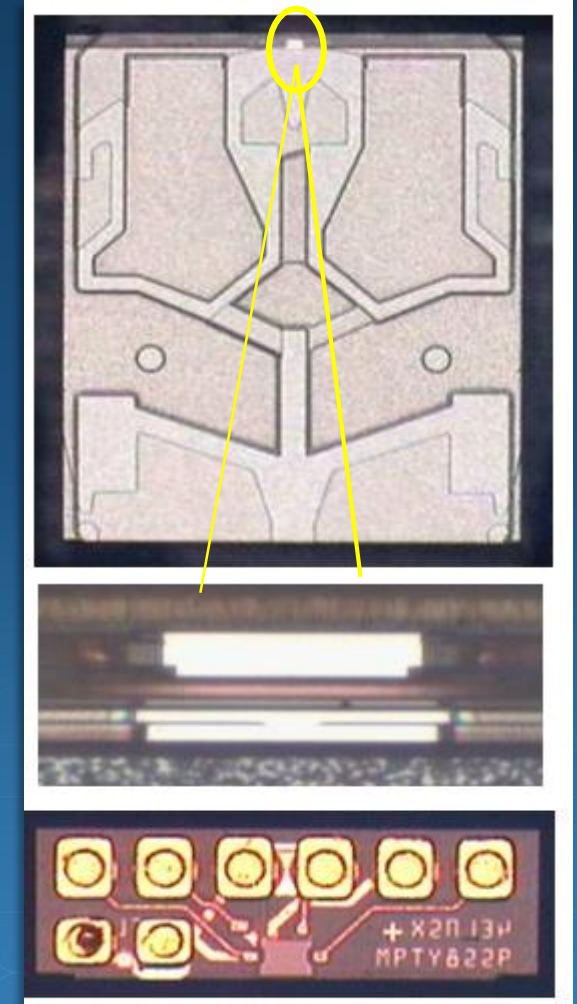
Krisda Siangchaew
Slider Fabrication Process Development

Slider Fabrication

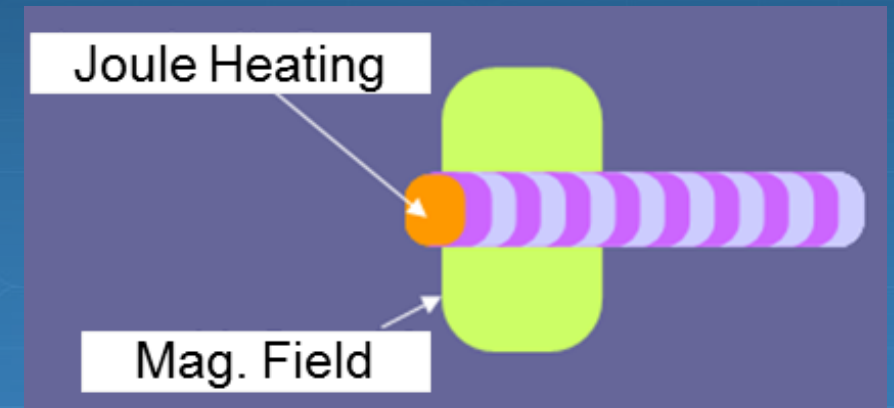
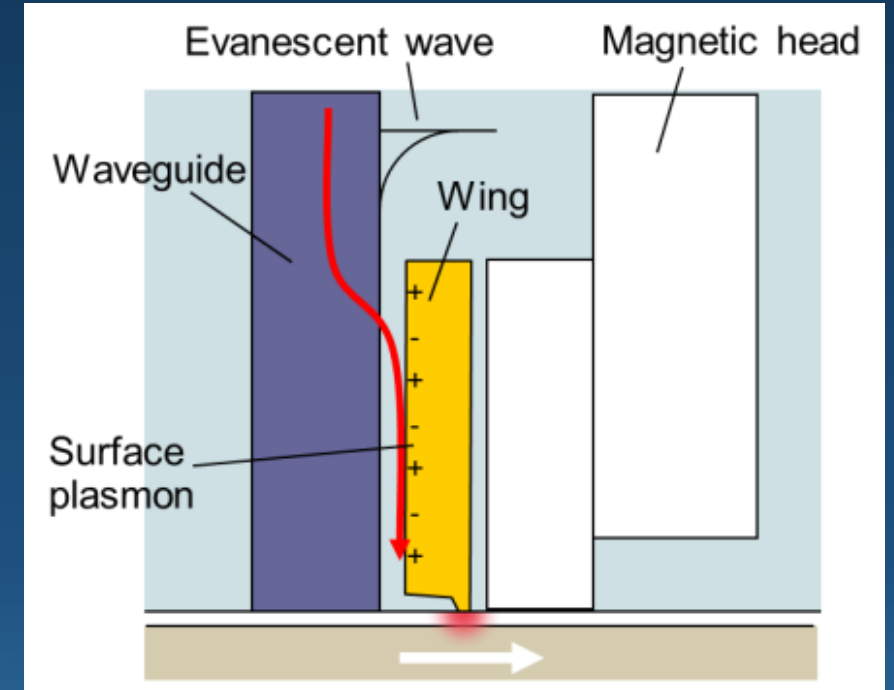
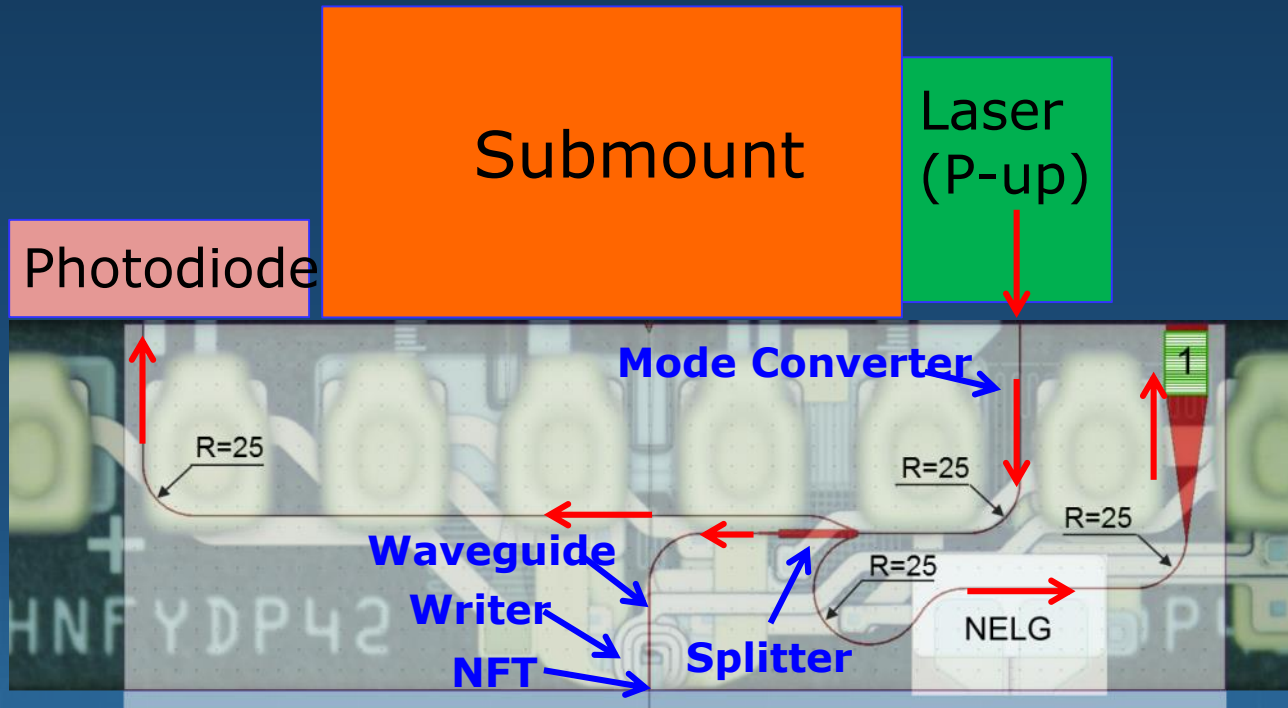
- Slicing
- Grinding
- Lapping
- Thin film deposition
- Photolithography
- Plasma etching
- Cleaning
- Testing / inspection



← 1 mm →

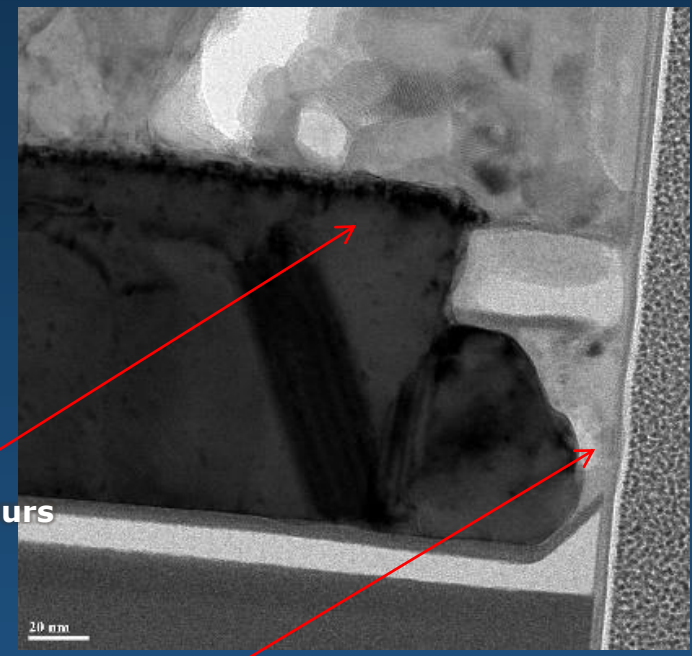
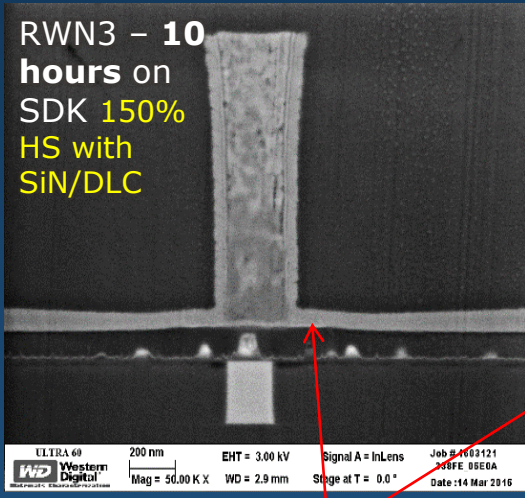


Heat-Assisted Magnetic Recording



Microanalysis

HAMR3 - RWN3

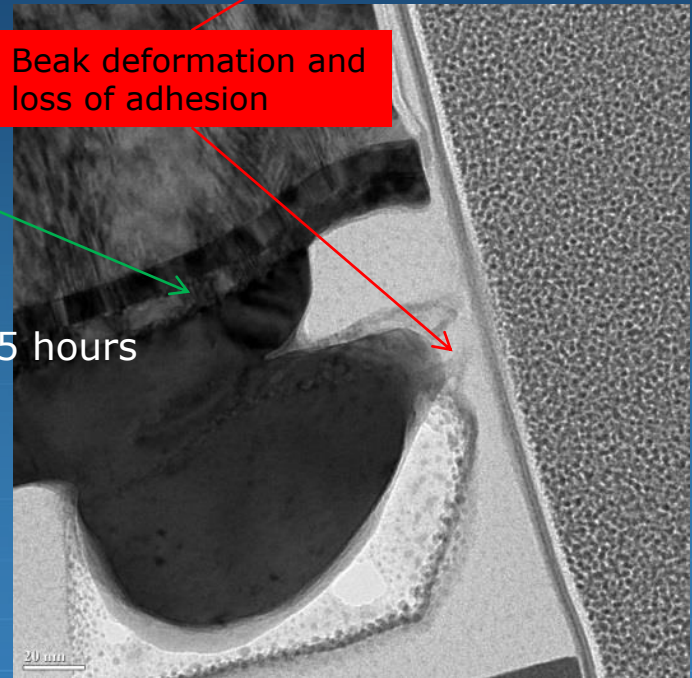
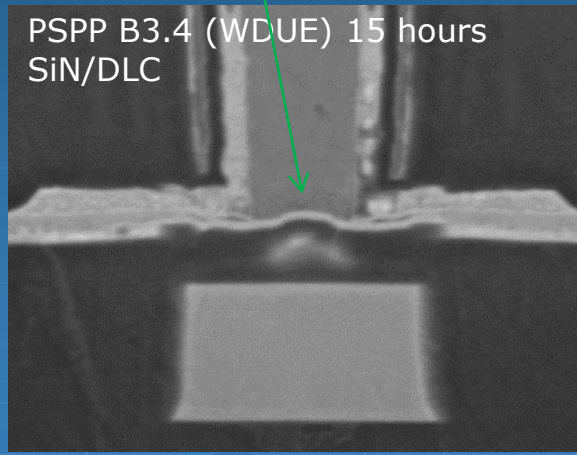


Significant Fe oxidation and diffusion

Reduced Fe oxidation and diffusion (but larger gap)

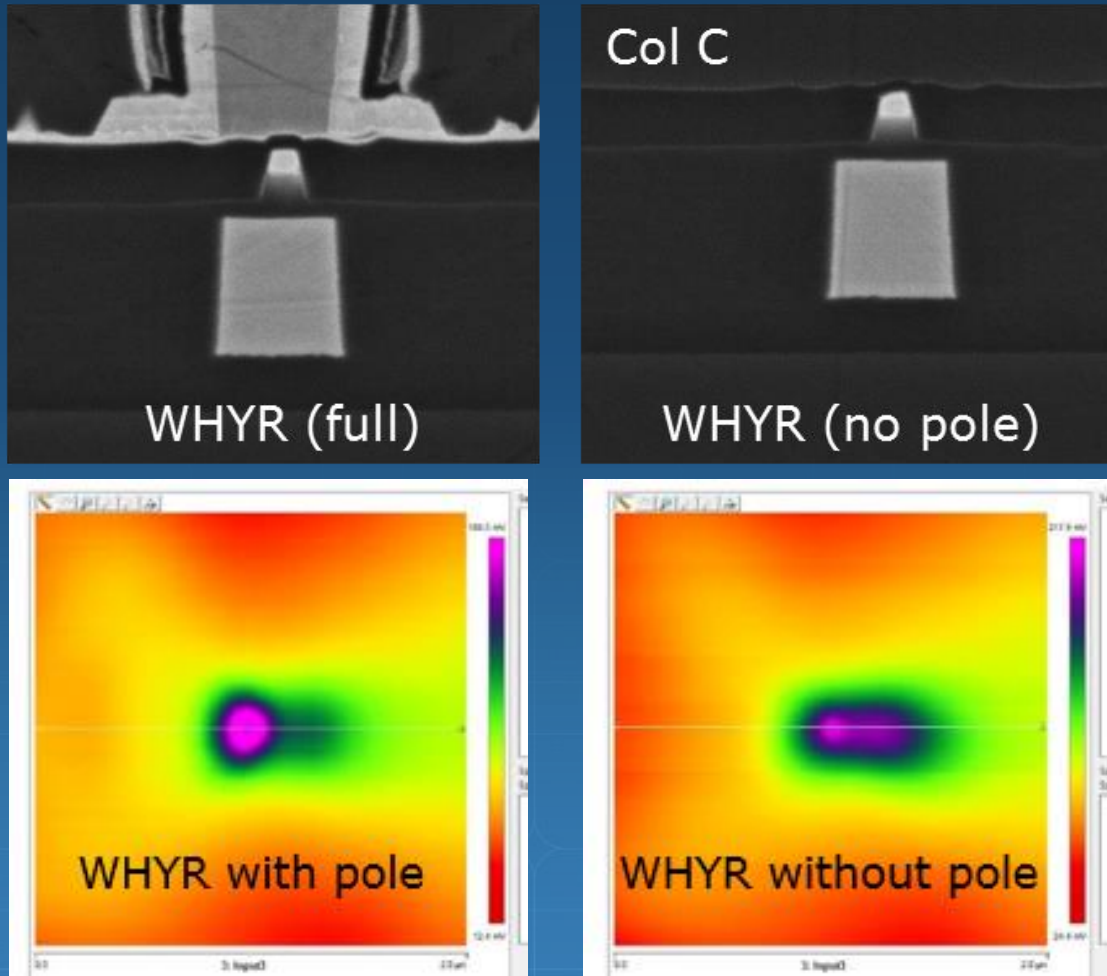
Beak deformation and loss of adhesion

PSPP B3.4



High Spatial Resolution Performance Measurements

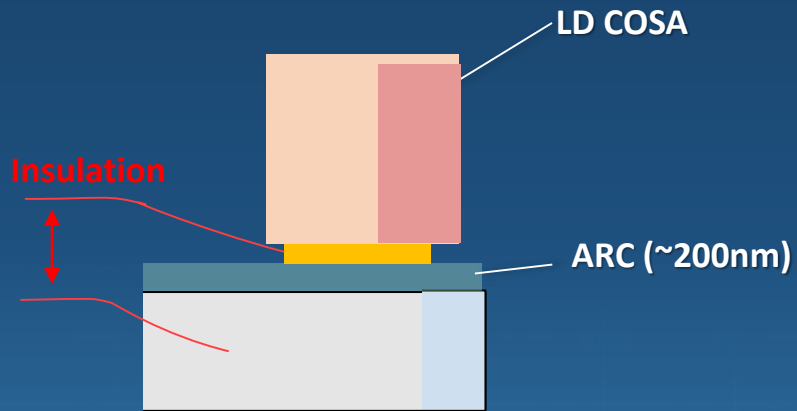
Scanning Thermal Microscopy



- Structural and chemical information are readily available
- Localized, application-specific performance information is lacking and needed

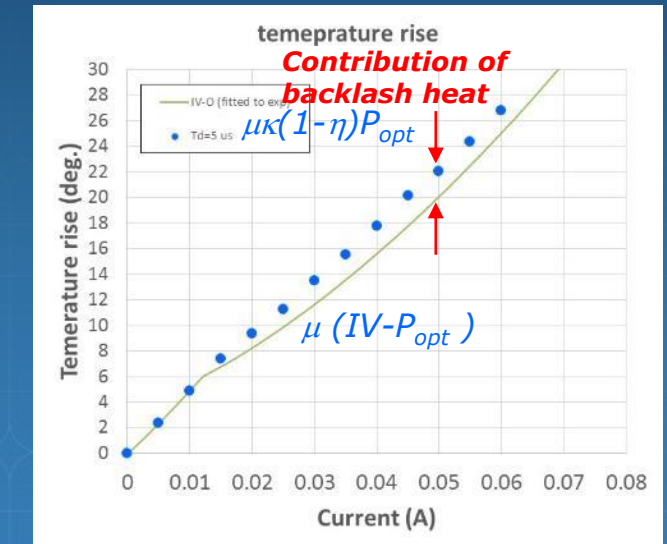
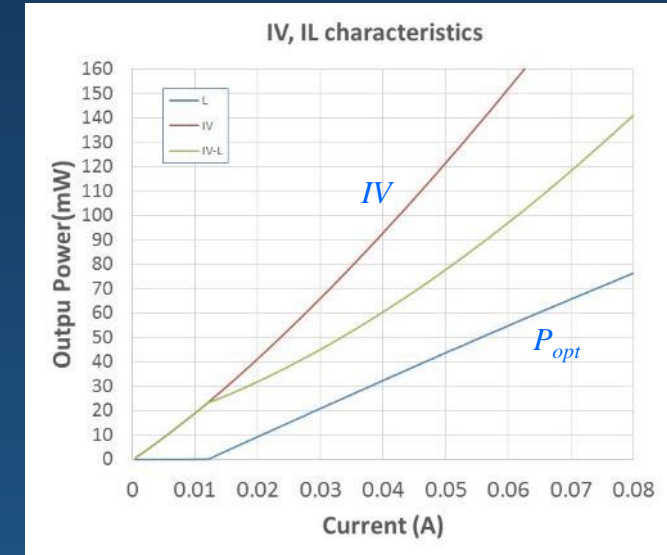
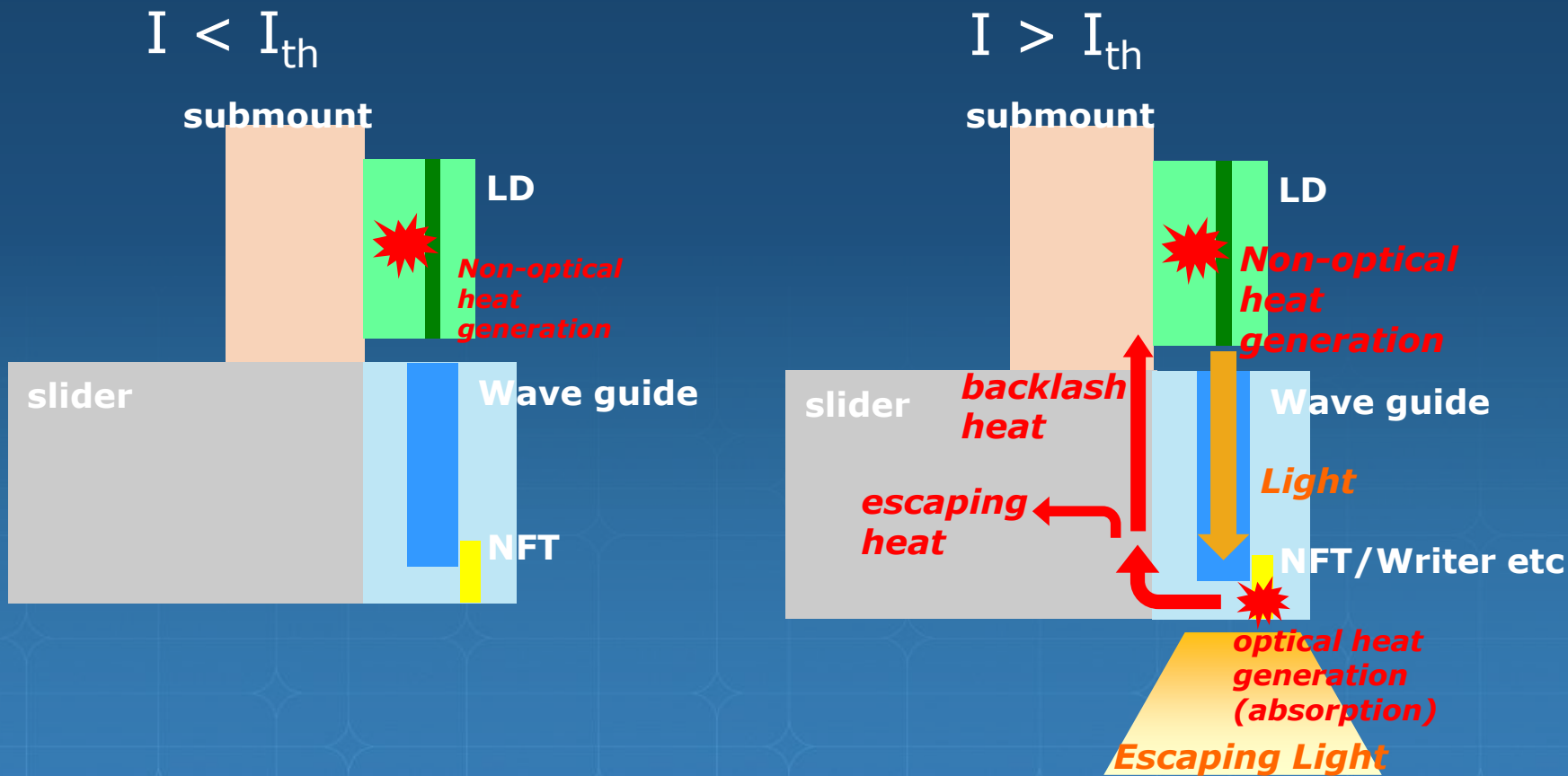
Customized Inspection Metrology and Methodology

R & T spectrometry and data analysis tools



LD back heating by head absorption

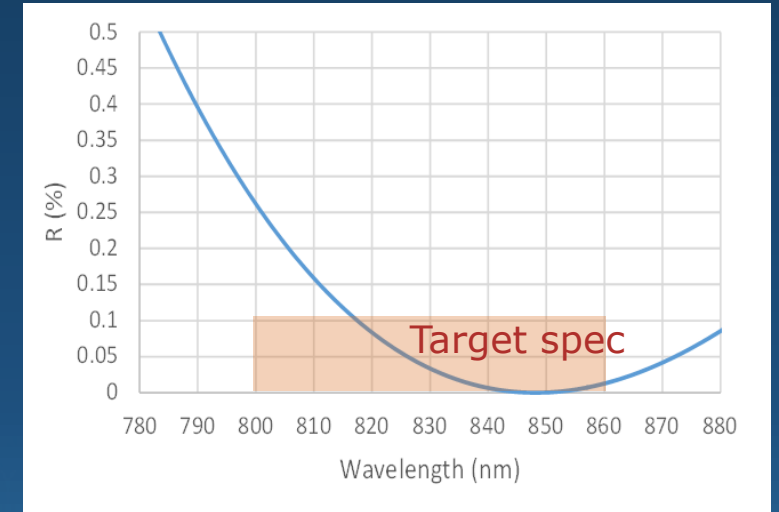
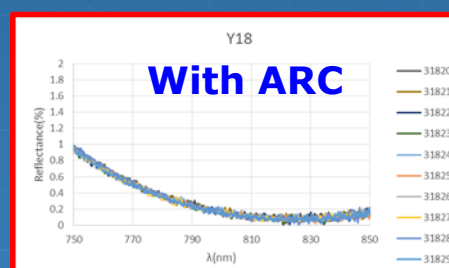
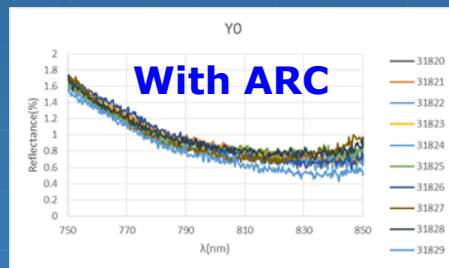
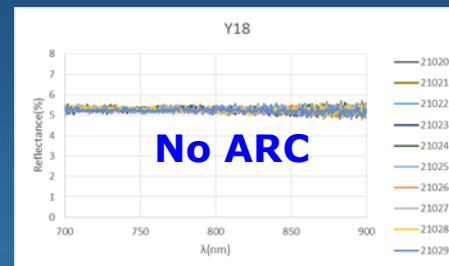
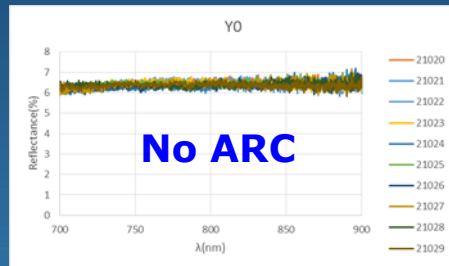
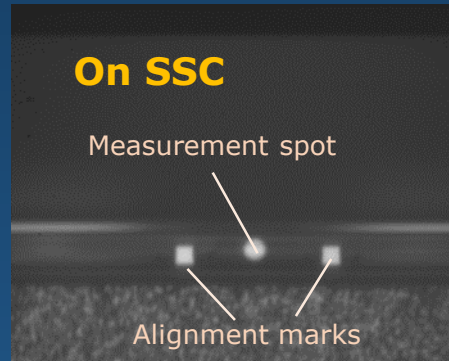
- Measured laser temperature rises for HAMR3 heads are slightly above the target (<20deg).
- Remarkable head temperature rise due to back-heating
 - Need to quantify contributions from other heat sources (TFC, Writer).



Reflectivity spectrum measurement on ARC coated Rbar



Microscopic spectrophotometer



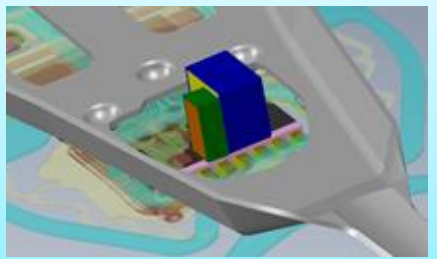

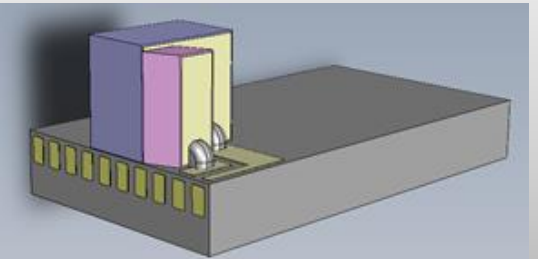
ARC reflectivity spectrum estimated from coupon sample measurement

Measured reflectivity spectrum shifts by about 20nm shorter side due to focused beam effect.

HAMR Light Delivery Design Roadmap

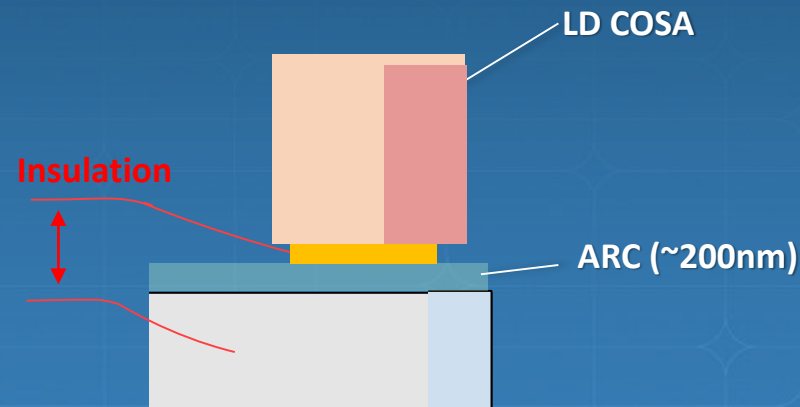
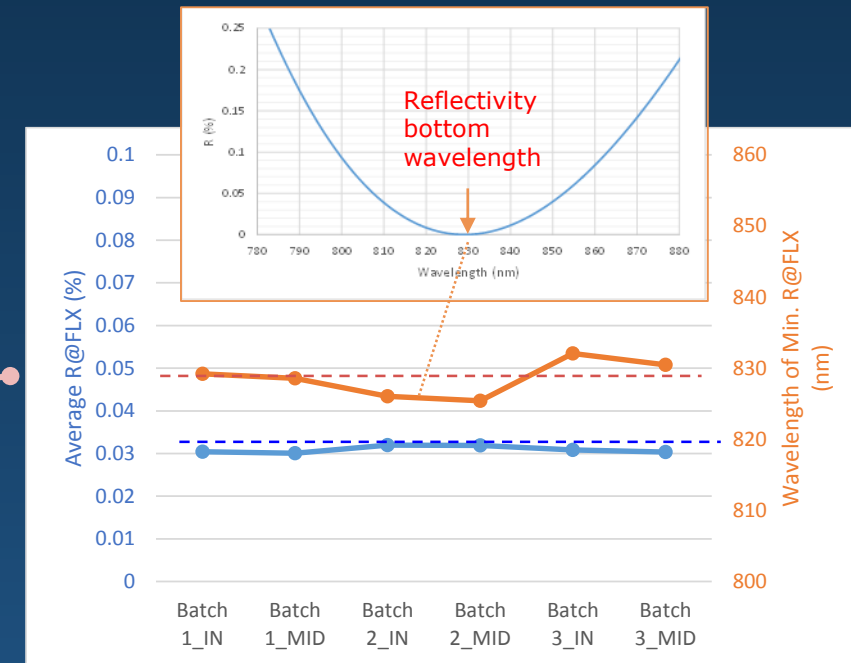
	CY2016				CY2017				CY2018				CY2019			
	CQ1	CQ2	CQ3	CQ4	CQ1	CQ2	CQ3	CQ4	CQ1	CQ2	CQ3	CQ4	CQ1	CQ2	CQ3	CQ4
Product Design Roadmap																
- Slider Platform	uFemto								uFemto-Long							
- R/W Technology	SMR				TDMR , STAR				TDMR + STAR , HAMR							
- Slider-suspension bond pads	8pads				10pads				12 - 14pads							

**HAMR
Light Delivery Design**

HAMR3/Gen4	Gen5	Gen6
		

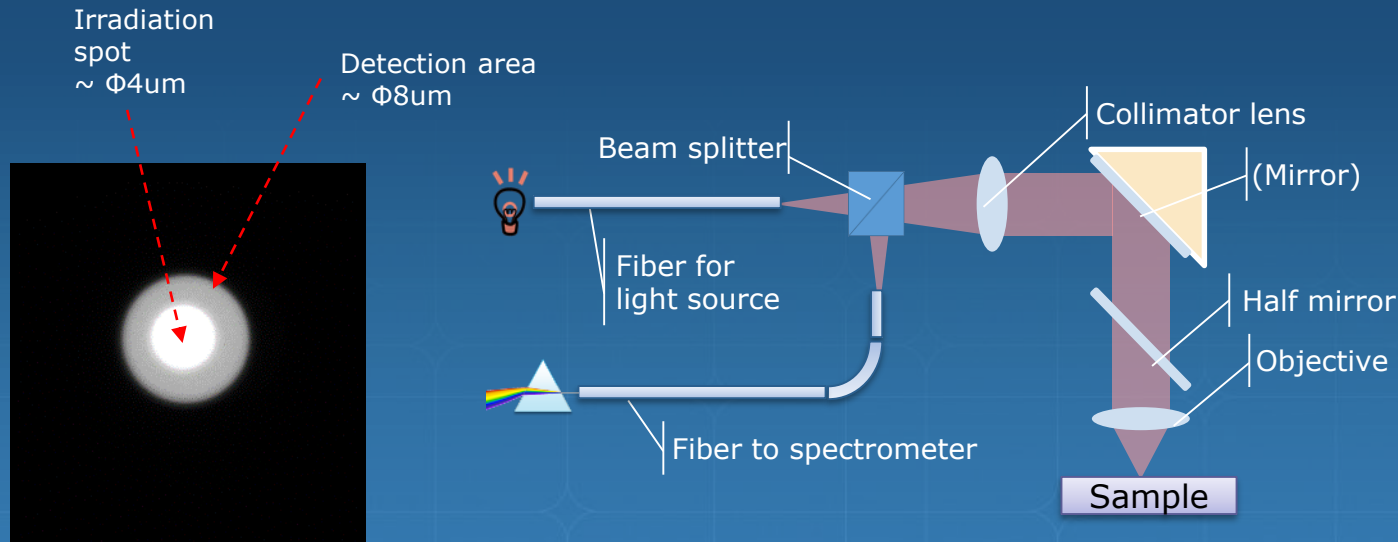
ARC: Requirements and status

- Reflectivity spec.: <math><0.1\%</math> averaged over 830+/-30 nm (tentative target)
- Established process control scheme to meet the reflectivity spec. in HICAP.
 - Installed R & T spectrometry and data analysis tools.
 - Established coupon-base process control scheme using reflectivity bottom wavelength.
 - Applied RWN28 with backside pattern. ← Verifying.
 - **Introducing Rbar-base metrology for direct verification.**
- Electrical insulation > 2M Ω (between solder pad and slider body)
 - Confirmed > 10M Ω for ODW ARC.
 - Need to define measuring condition.
 - Need to verify reliability and durability against scratch and other stress.
 - Investigating for the metrology.



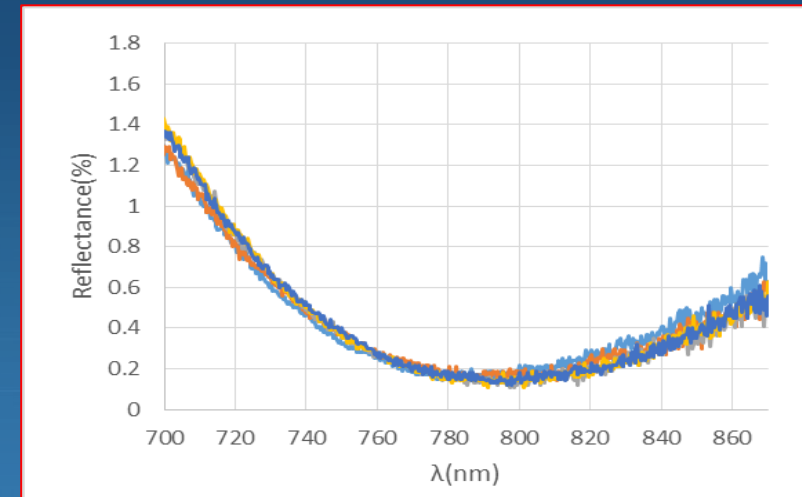
Microscopic spectrophotometer

- Objective lens : Olympus LMPLN-IR 50X → Effective multiplication is 27x due to shorter collimator
Fiber : Irradiation ϕ 100 μ m
: detection ϕ 200 μ m + position adjusted
Light source : HL2000
Collimator : Edmund f=100mm VIS-NIR
Spectrometer : Ocean Optics USB2000+ (Measurement range 530~1100nm)
·Reference: Si plate reflection



Measurement spot

Configuration of microscopic spectrophotometry



Reflectivity measured on HAMR3 slider with ARC