

# Y. OKABE LAB.

## Structural Health Diagnostic Systems



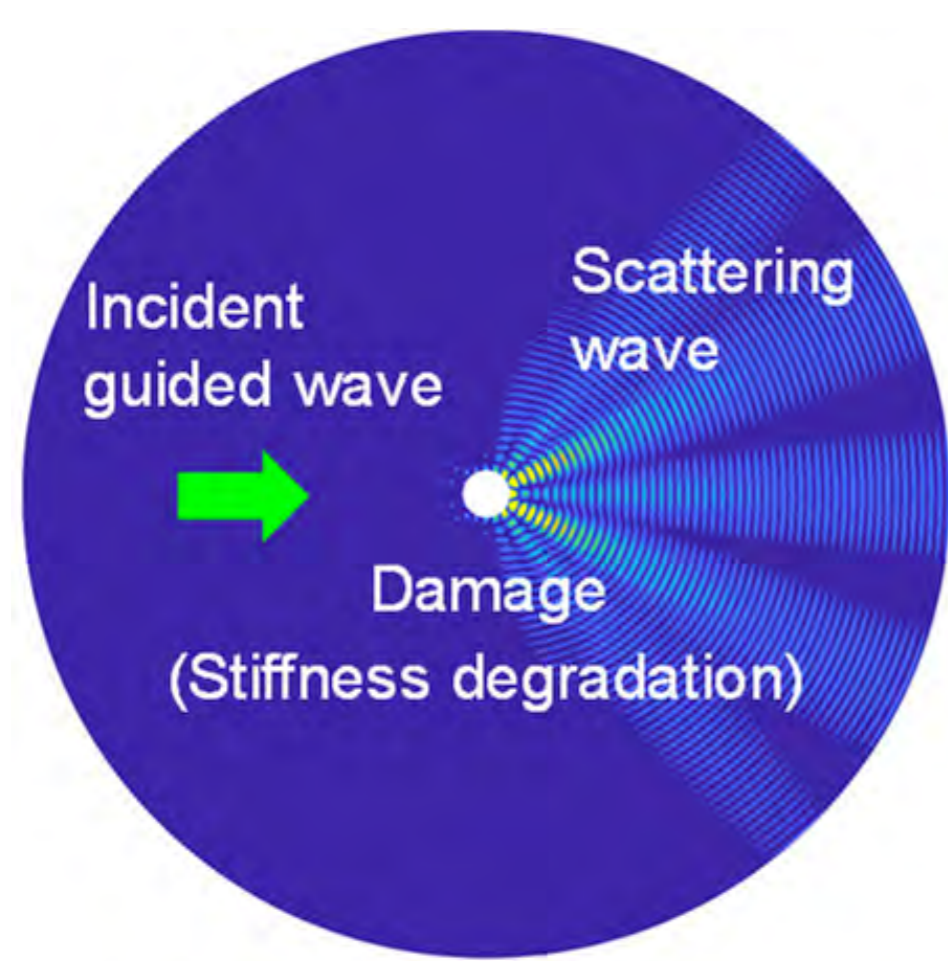
Department of Mechanical and Biofunctional Systems  
Center for Integrated Underwater Observation Technology

Structural Health Diagnostics  
Department of Systems Innovation, Graduate School of Engineering

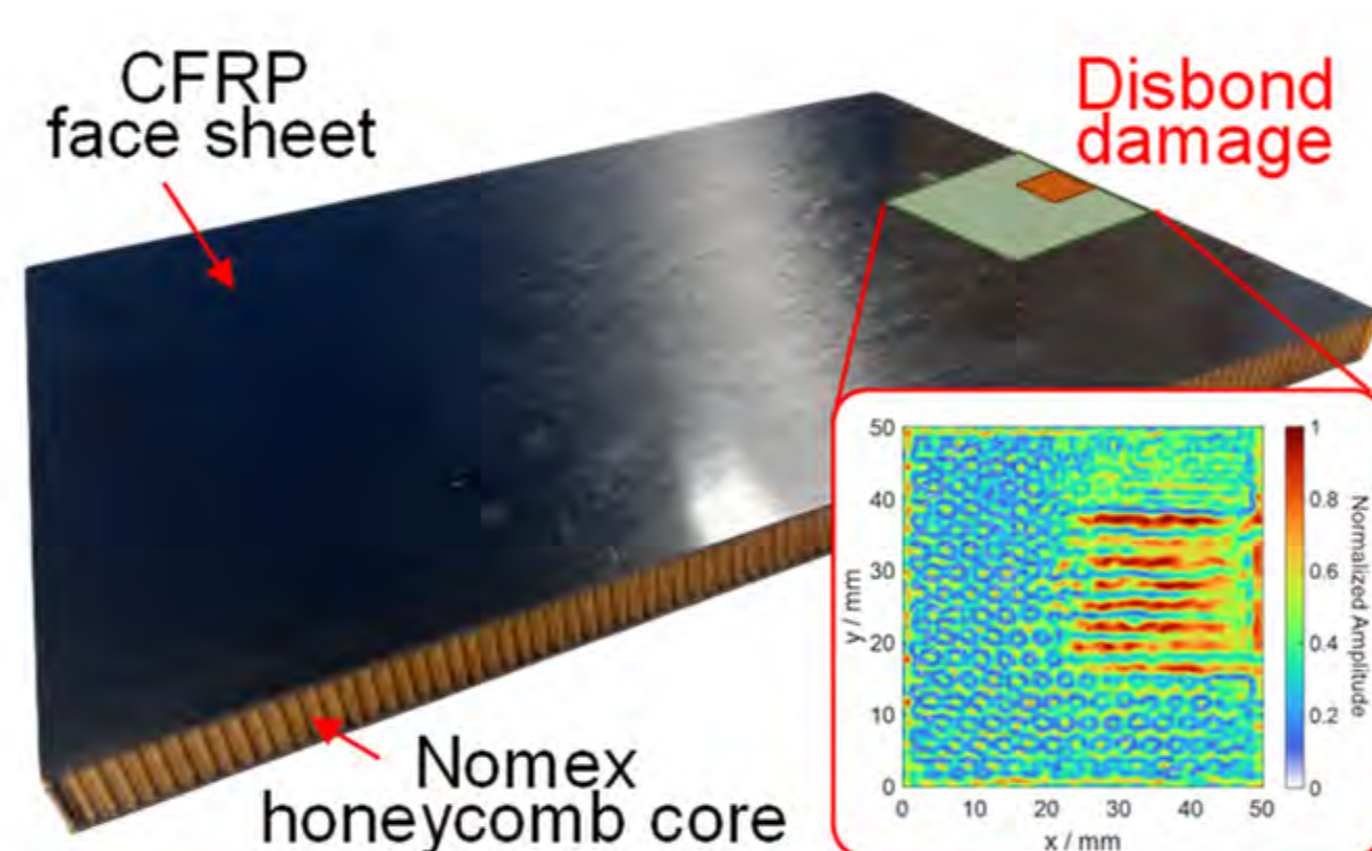
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Lightweight composite structures have been applied to airplanes and automobiles. For the health diagnostics of the structures, we are developing structural health monitoring systems with optical fiber ultrasonic sensors and non-destructive inspection techniques using laser ultrasonics. In addition, we are attempting to construct an inspection system applicable to extreme environments.

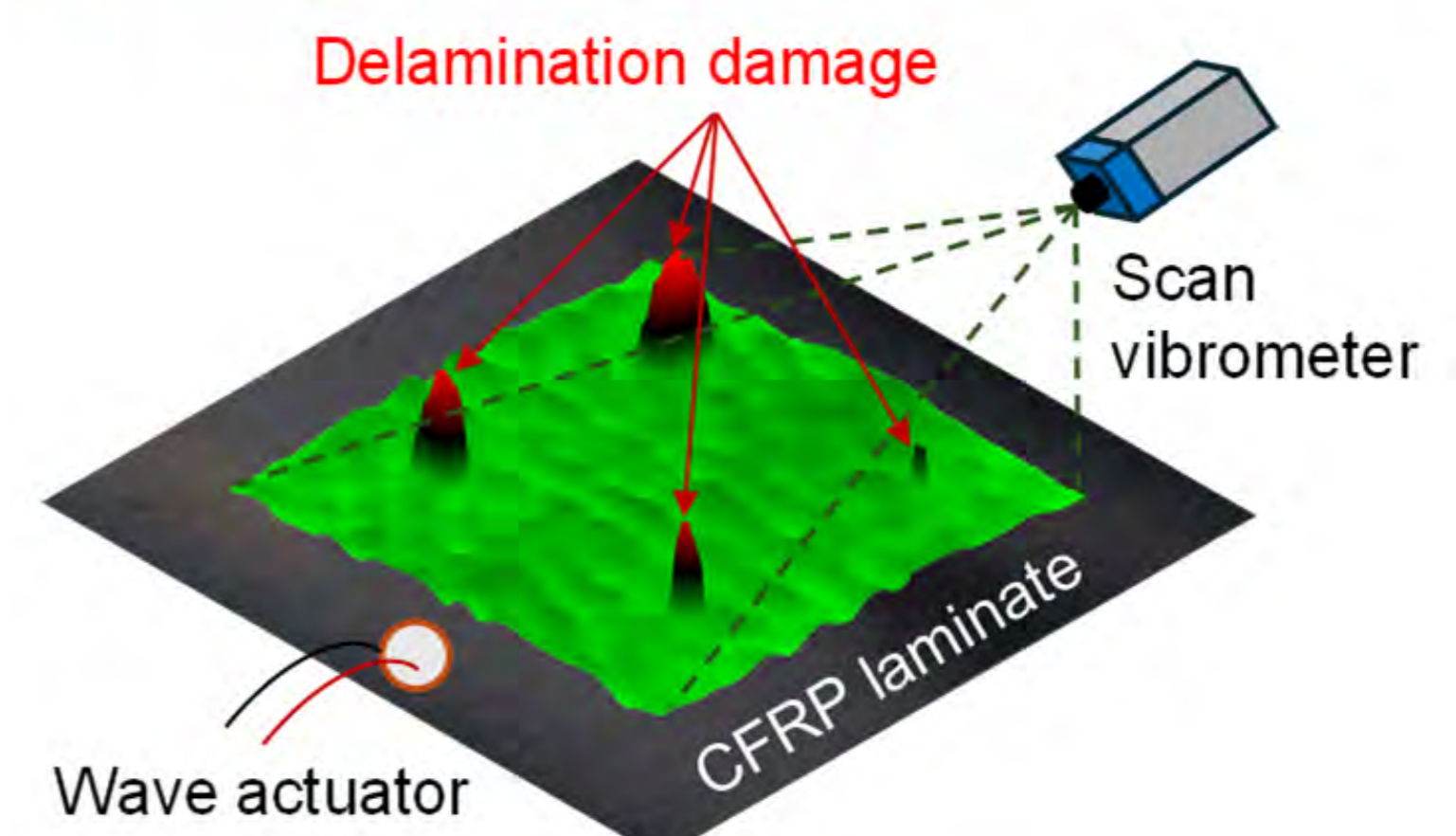
### Structural Health Monitoring Using Ultrasonic Guided Waves



Calculation of scattering wave at an impact damage in CFRP based on thin plate theory



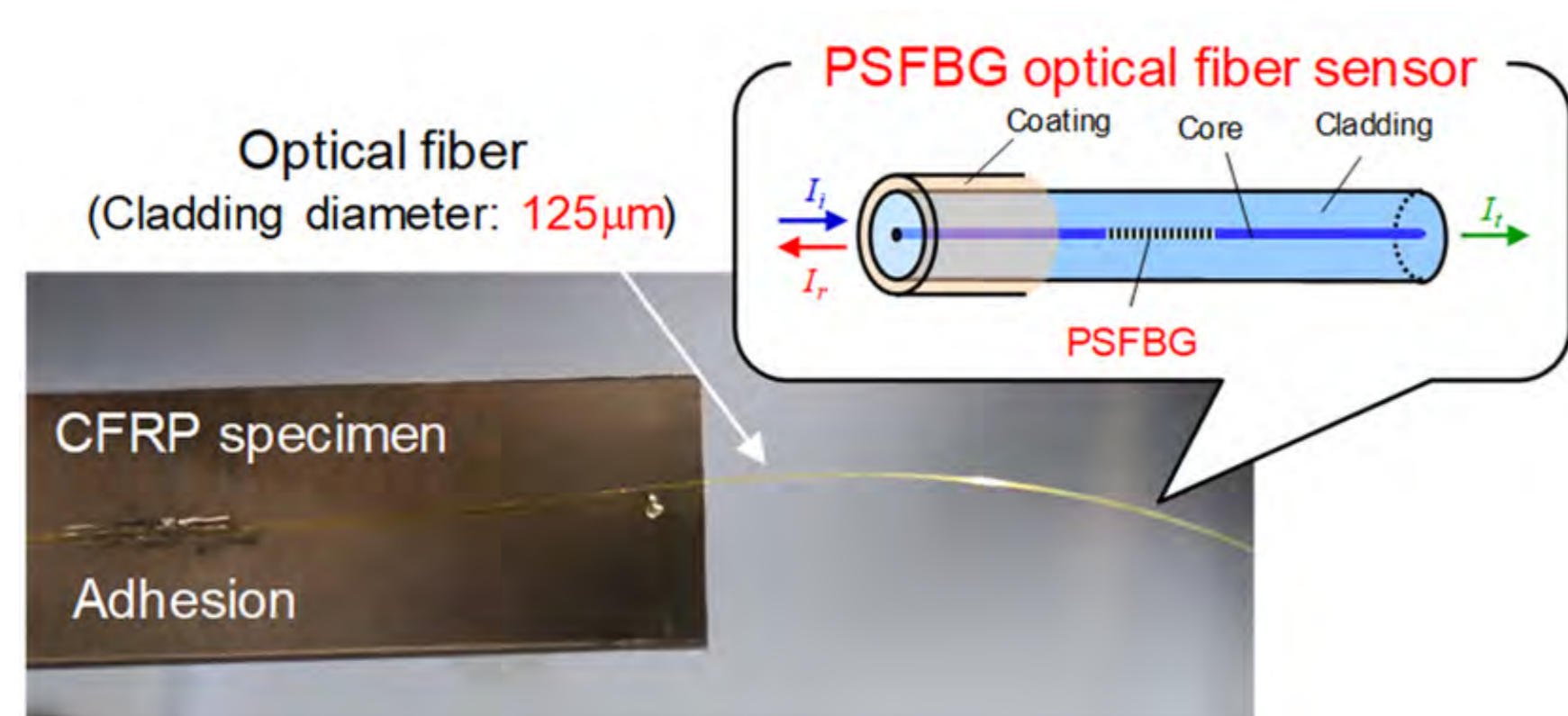
Damage detection in honeycomb sandwich structures using laser-excited ultrasonic guided waves



Delamination detection in a CFRP laminate based on guided wave-activated local defect resonance

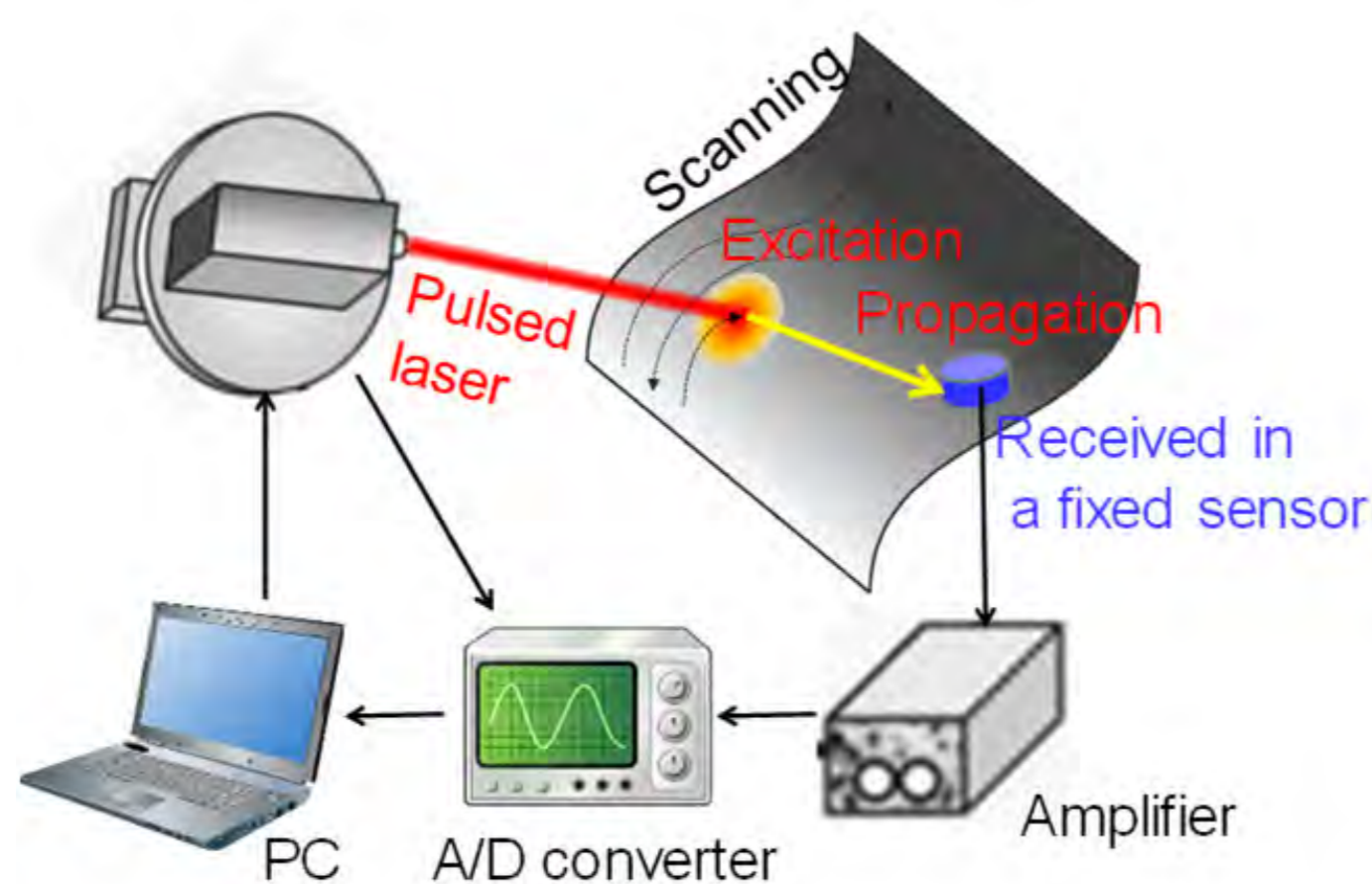
### Non-destructive Inspection System Applicable to Extreme Environments

#### Optical Fiber Sensor (Ultrasonic Receiving)

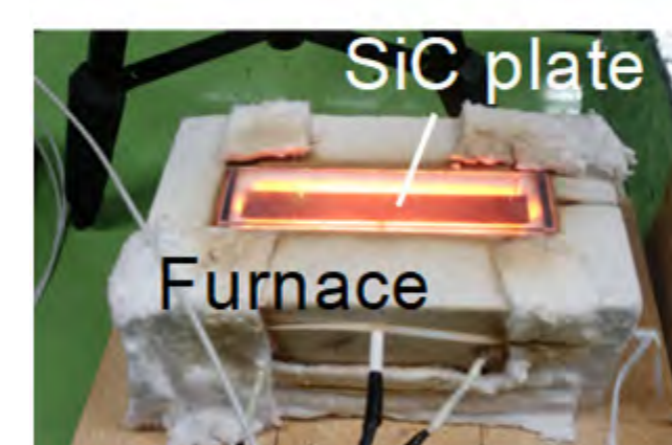


Optical fiber ultrasonic sensor achieving remote AE measurement

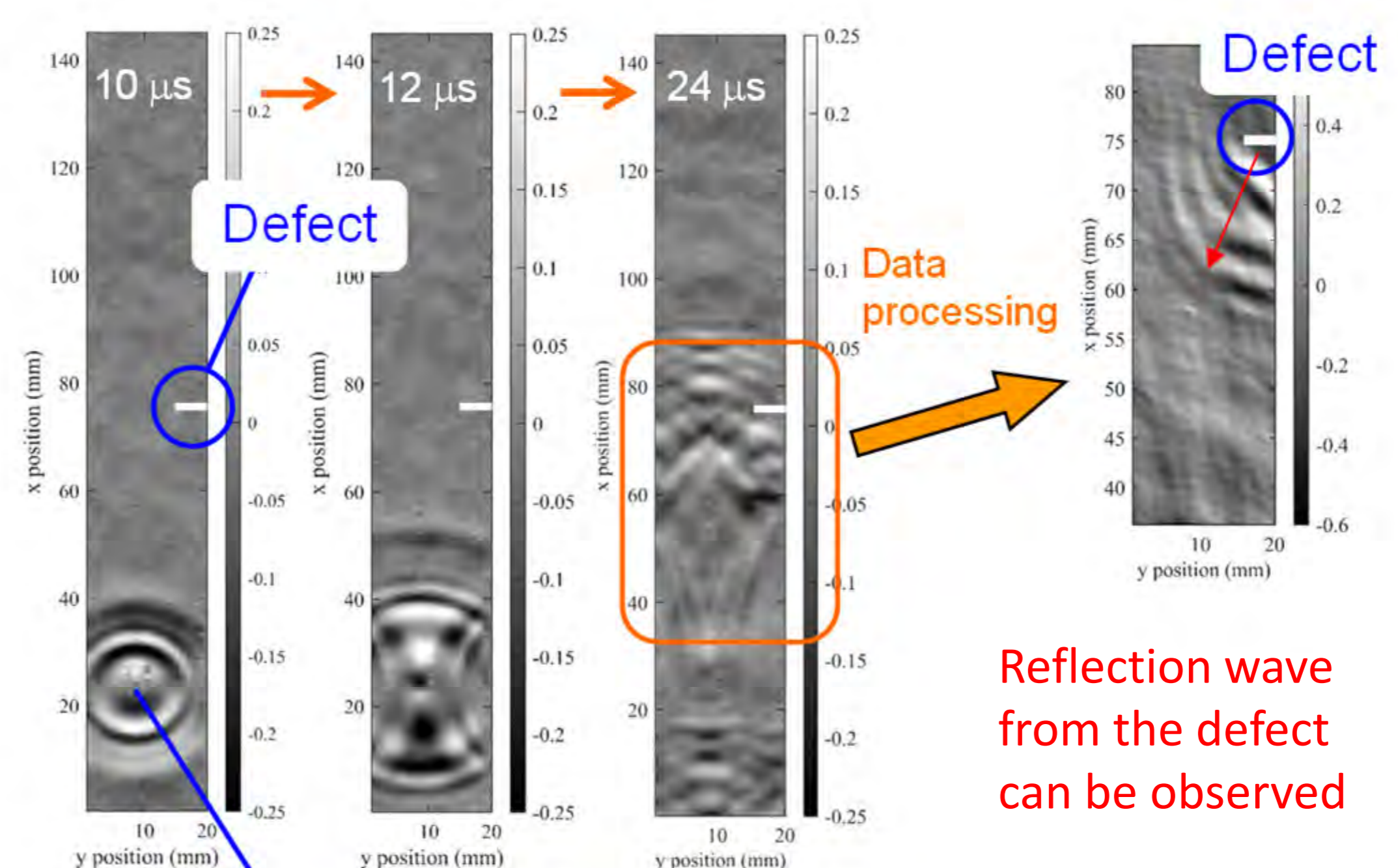
#### Laser Ultrasonics (Ultrasonic Excitation)



Laser ultrasonic visualizing inspector (LUVI-CP, Tsukuba Technology Co., Ltd.)



Ultrasonic inspection was conducted to a ceramic plate heated up to 1000 °C



Adhesion point of an optical fiber

Even at high temperature of 1000 °C, ultrasonic propagation behaviors can be visualized, which enables the observation of reflection waves from defects