

ENHANCEMENT OF LASER ABSORPTIVITY IN METAL BY LASER SURFACE MODIFICATION

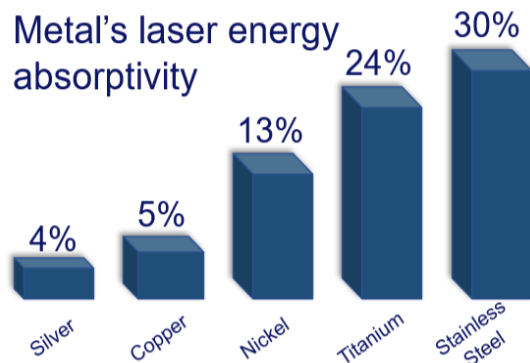
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RESEARCH BACKGROUND

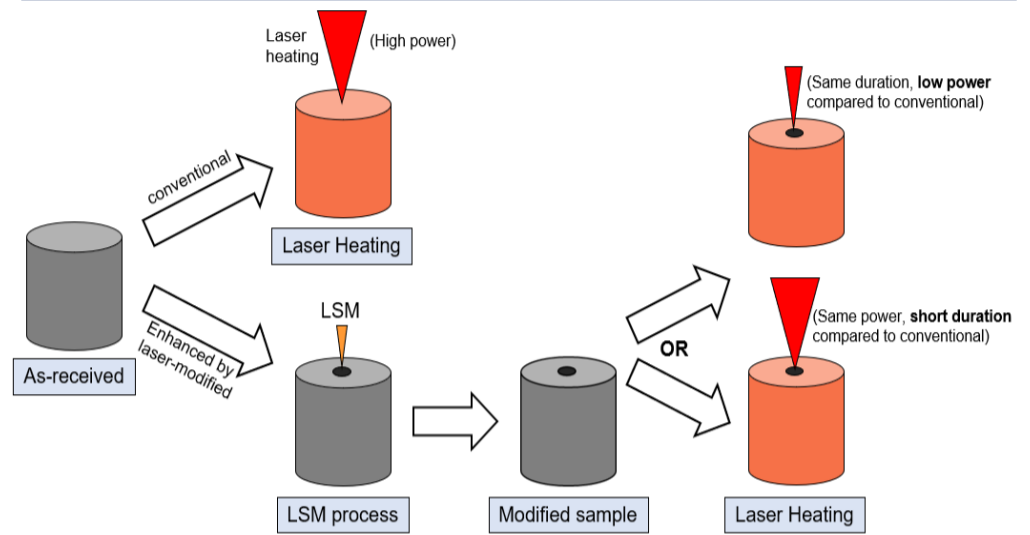
An innovation which currently in 4th TRL aims to improve laser-material interaction by increasing absorption of laser energy through surface roughness using laser surface modification

MOTIVATION

- Metal has **low laser energy absorptivity**
- Industries demand for high laser power to compensate for **low energy efficiency**
- However, the absorptivity can be enhanced by increasing **surface roughness** and **oxide layer**
- Low power **Laser Surface Modification (LSM)** could increase surface roughness which can further improve energy absorptivity

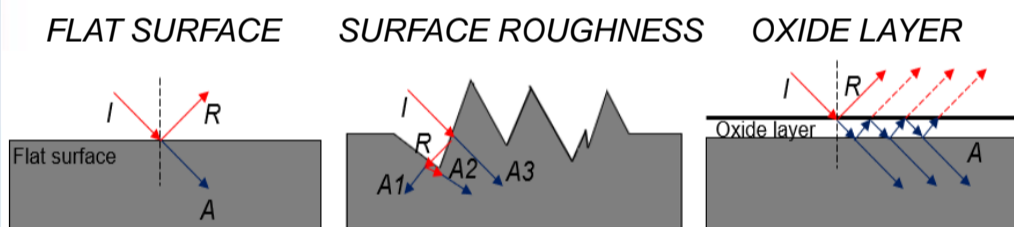


PROCESS FLOW AND VALIDATION



	Non-modified surface	Modified with LSM 27 W
Height image		
Color image		

MECHANISM TO INCREASE ABSORPTIVITY



ADVANTAGES OF LSM

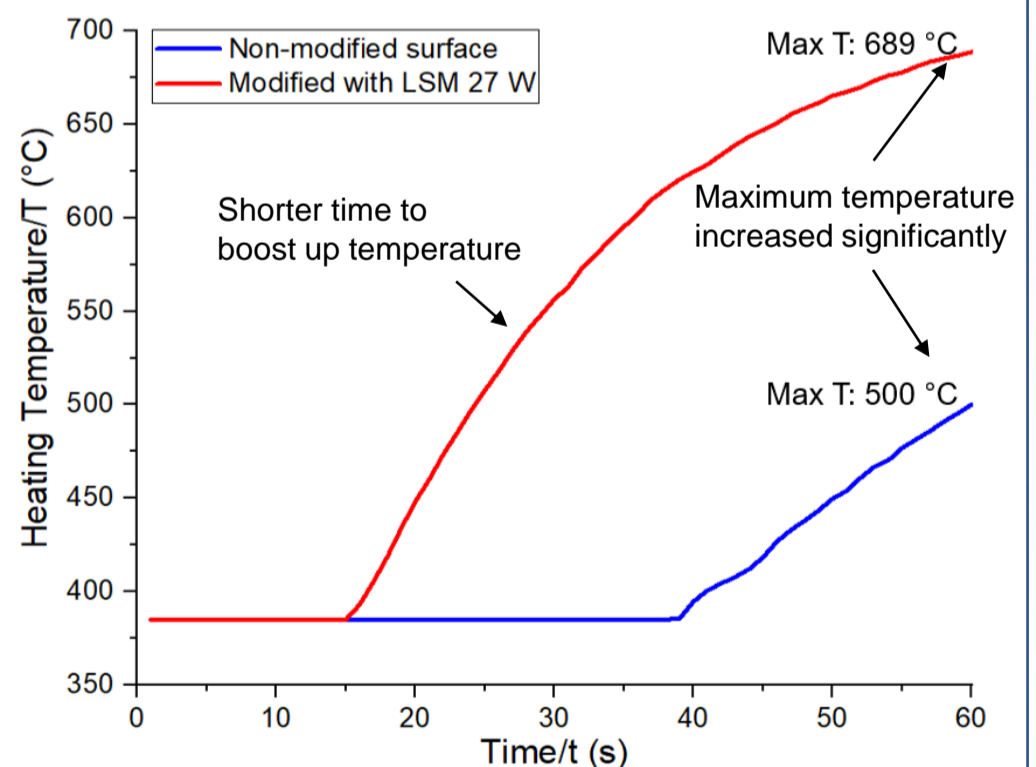
- Fast process
- Uniform finishing
- High accuracy and precision
- Non-consumable
- Low operation cost

IMPACT OF THE INNOVATION

- **ENVIRONMENT**
Less laser energy usage to perform similar task
- **ECONOMY**
Decrease capital cost for laser machine
- **SOCIAL ECONOMY**
Increase implementation of laser technology in SME leading to advance society

PUBLICATION & CONFERENCE

- "Effect of Laser Surface Modification (LSM) on laser energy absorption for laser brazing"
ICMER 2019, IOP Conf. Ser.: Mater. Sci. Eng. 2020 Apr 1 (788, 1, 012013)
- "Enhancement of Laser Heating Performance by Laser Surface Modification on Titanium Alloy"
NCON-PGR 2020 CONFERENCE, JMES (Accepted)
- "Influence of Laser Surface Texturing Parameters on The Surface Characteristics of Ti6Al4V and Their Effect on Laser Heating"
JOURNAL OPT LASER ENG. (Accepted)



"Modified surface improved energy absorptivity in form of temperature rise"

FINANCIAL SUPPORT & COLLABORATION

- **RDU1903118** Effect Of Surface Modification On Lowering Energy Requirement For Indirect Laser Brazing
- **PGRS200305** Effect Of Modified Titanium Surface On Energy Absorption For Laser Brazing.
- **PROF T ARIGA** From Tokai University. Advisor of the project
- **TOKYO BRAZE CO., LTD** Supplying raw material