《光学学报》“英文长摘要”格式

1、篇幅：英文长摘要篇幅要求在400~600字（单词数）。

2、结构：

（1）题目、作者和单位（与中文信息对应的英文信息）

（2）英文长摘要正文：

1）研究目的**(Objective)**（突出所做工作的重要性和必要性）；

2）研究方法**(Methods)**；

3）创新性结果**(Results and Discussions)**：请标示出所对应的正文中的图表，以括号标注，如(Fig.3)；

4）结论**(Conclusions)；**

（3）关键词**(Key words)**。

3、不要加参考文献。如果有引用其他文章，建议作者转述。

4、请删除原英文摘要。

5、“英文长摘要”题目中的单词首字母请大写（除介词外）。

6、“英文长摘要”请放在文末，另起一页。

附**快报**参考示例：

Laser Powder Bed Fusion for Fabrication of Metal Orthopedic Implants

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Abstract

Objective Austenitic stainless steel is widely used during industrial production due to its excellent corrosion resistance, high temperature resistance and sound mechanical properties. Compared with traditional arc welding technology, laser welding shows great advantages in terms of high energy density, high welding speed and low heat input. So far, however, compared study about welded joints quality after the two welding methods is few to see and difference between them is still unclear. In this paper, a comparative investigation of 2 mm austenitic stainless steel prepared by arc welding and laser welding was carried out to systematically evaluate the differences about as-weld quality between them, and further provide a beneficial reference for the selection of welding technologies and processes in practical engineering applications.

Methods Laser welding and arc welding of 2 mm SUS301L-HT stainless steel plates were performed using fiber laser device (IPG YLR-4000) and inverter arc power supply (Fronius TPS4000), respectively. After that, microstructural morphology, hardness distribution and tensile strength were obtained by optical microscope, microhardness meter and electronic universal testing machine, respectively. Moreover, fracture morphology after tensile tests was also analyzed by scanning electron microscope. According to above comparative characterization results, the differences between laser and arc welds were obtained considering weld forming, microstructure and mechanical properties.

Results and Discussions By comparing the weld macrostructure, microstructure and mechanical properties of 2 mm SUS301L-HT stainless steel joints prepared by laser and arc welding, some obvious differences can be obtained: (1) Weld bead formation. Compared with MIG welding, laser welds showed a small deformation, a uniform shape, and a narrow width decreasing from 6.35 mm to 1.64 mm (Fig.3). (2).

Microstructure. Laser welds were composed of fine columnar austenite dendrites and interdendritic δ ferrite with a narrow heat affected zone (HAZ). Conversely, MIG welds consisted of large columnar austenite dendrites and interdendritic δ ferrite with a wide HAZ. Moreover, the vermicular ferrite dendrites were altered to strip ones, and then disappeared in coarse solid solution austenite grains of base metal (BM) with the increase of the distance from fusion line. (3) Microhardness. The hardness of laser welds was about 240 HV, in which the hardness of HAZ was slightly higher than that of fusion zone (FZ), but lower than that of BM. However, the maximum hardness of MIG weld was more than 300 HV while a relatively low hardness of only 200 HV was observed near FZ. (4) Tensile property. Laser welded joints displayed a strength of 979.1 MPa with an elongation of 48.2% (Fig.6). Moreover, the mechanical failure occurred in the FZ, in which there existed many dimples in the fracture surface, showing a typical ductile feature (Table.2). However, the tensile strength of MIG welds were only 779.6 MPa with a 21.3% elongation. Furthermore, fracture occurred in the HAZ, in which the upper part of the fracture showed obvious tearing zones while the lower part a typical ductile feature.

Conclusions There exist obvious differences in weld macrostructures, microstructures and mechanical properties between laser welding and arc welding of 2 mm SUS301L-HT stainless steels. Due to a high energy density, high welding speed and low line energy, laser welding shows some advantages over arc welding. First, laser welds display a narrow width, a low deformation, and a uniform weld back forming. Then, laser welds also show a finer microstructure and a small HAZ. In terms of mechanical properties, laser welds possess a high tensile strength with great extensibility. In summary, compared with arc welding, laser welding shows specific advantages in weld macrostructure, microstructure and mechanical properties.

Key words laser technology; laser welding； hardness； stainless steel joints