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[\[Image PDF \(2320K\)\]](#) [\[References\]](#)**Effects of Welding Pulse Energy and Fluoride Ion on the Cracking Susceptibility and Fatigue Behavior of Nd:YAG Laser-welded Cast Titanium Joints**[Her-Hsiung HUANG^{1\)}](#), [Mau-Chin LIN^{2\)}](#), [Chien-Chan LIN^{3\)}](#), [Sheng-Chieh LIN^{4\)}](#), [Chii-Chih HSU^{3\)}](#), [Fang-Lung CHEN^{3\)}](#), [Shyh-Yuan LEE^{1\)}](#) and [Chun-Cheng HUNG^{5\)}](#)

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Abstract:

In this study, the cracking susceptibility and fatigue behavior of Nd:YAG laser-welded cast Ti joints (welding pulse energy: 11, 15, and 18 J) in fluoride-containing (0 and 0.5% NaF) artificial saliva were evaluated using constant elongation rate test (CERT) and fatigue test (FT), respectively. Both CERT and FT were also carried out in open air as controls.

Results showed that increasing the welding energy increased the elongation and fatigue life, but decreased the tensile strength, of cast Ti joints in open-air environment. With a welding energy of 11 J, the fluoride ions in the artificial saliva increased the cracking susceptibility and decreased the fatigue life of Ti joints. When the welding energy exceeded 15 J, the presence of fluoride ions still increased the cracking susceptibility, but did not reduce the fatigue life of Ti joints. Rupture of Ti joints — if it occurred — occurred only at the welded metal (*versus* the non-welded part).

Key words:

[Welding pulse energy](#), [Fluoride](#), [Mechanical property](#)

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