

316LN

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Creep-Fatigue Properties of Type 316LN Stainless Steel

150

316LN

-

10

, 600 strain  $2 \times 10^{-3}/\text{sec}$

가

가

가

가

cell

planar

가

가

가

가

Abstract

Strain controlled low cycle fatigue tests including hold time of 10 minute at maximum tensile strain have been conducted for type 316LN stainless steels containing different nitrogen content at 600 and  $2 \times 10^{-3}/\text{sec}$  in air atmosphere. The addition of nitrogen increased the creep-fatigue life. Fracture modes were intergranular in all specimens. Cracks from the surface propagated along grain boundary and the depth of cracks decreased with the addition of nitrogen. Dislocation structures were changed from cell to planar with the addition of nitrogen. Carbides ( $M_{23}C_6$ ) were precipitated at grain boundary. Carbides were



Table 1. Chemical composition of specimens(wt%)

Spec. ID	C	Si	Mn	Ni	Cr	Mo	N	P	S
N04	0.018	0.67	0.95	12.21	17.78	2.36	0.042	0.006	0.002
N10	0.019	0.70	0.97	12.46	17.23	2.38	0.103	0.007	0.002
N15	0.020	0.67	0.96	12.19	17.88	2.41	0.151	0.007	0.002

- 1100 1  
 가 8 mm 7 mm  
 가 600  
 ±2 - Instron 8502  
 10 1.  
 0 2.0%  $2 \times 10^{-3}/\text{sec}$  strain  
 1000  
 - 75%  
 Instron 4505  $2 \times 10^{-3}/\text{sec}$  600  
 4 mm 가 25 mm  
 가 0.625 mm 2.125 mm 10  
 1 mm  
 transmission electron microscopy (TEM) TEM  
 perchloric acid, acetic acid, ethanol 1:4:1 20V, 5  
 JEOL 2000FX Scanning  
 electron microscopy (SEM)  
 4:6

3.

- 600  
 1  
 10 가 -  
 가 -

가 0.10%

[2] 가 - 가

planar slip 가 Cr

[2]. 가

가 가 .

2 . 0.1% 가 가 normalize 0.15% 가

cell

planar slip 가 가

0.15% 가 가

- cavity가

cavity가

cavity가

3 .

가

cavity

4

transgranular 가

- intergranular

cavity가

5 가

TEM 가 6 .

가

가

[5,6].

가

-

가

#### 4.

0.02%

0.04 0.15%

316LN

600

-

1.

가

-

가

2.

-

3.

가

가

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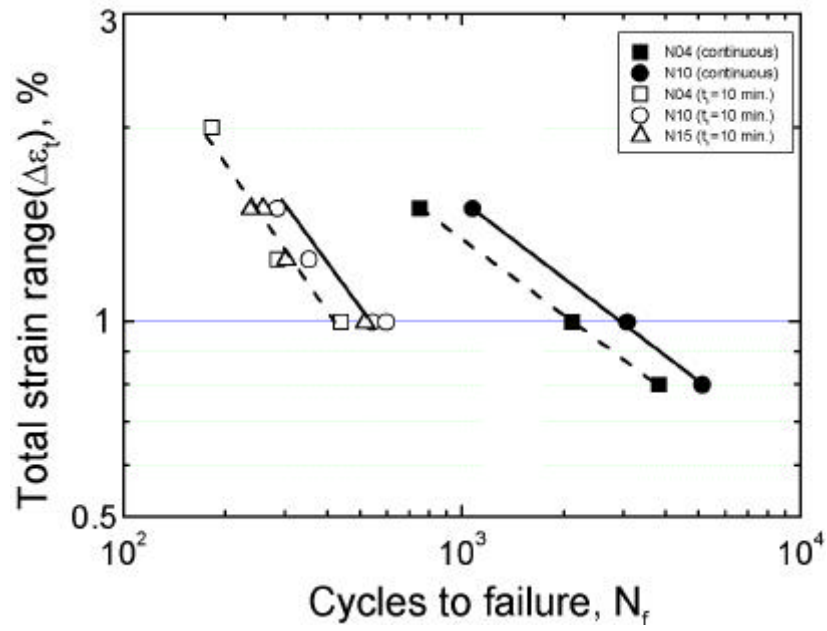


Fig. 1. Creep-fatigue life with nitrogen content at 600 .

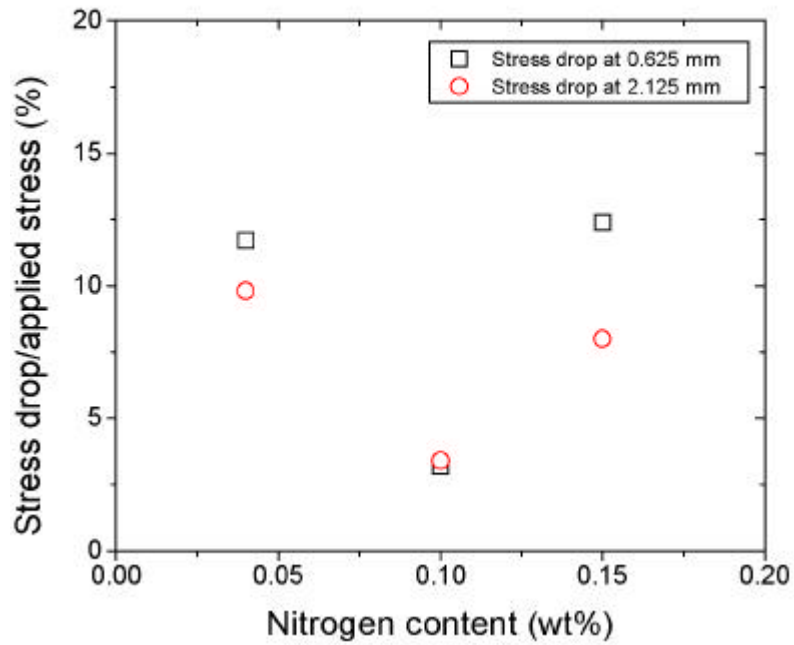


Fig. 2. Stress relaxation with nitrogen content at 600 .