

Supplementary Information

for

The effects of alloying elements Cr, Al, and Si on oxidation behaviors of Ni-based superalloys

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This document contains six supplementary figures and one supplementary table.

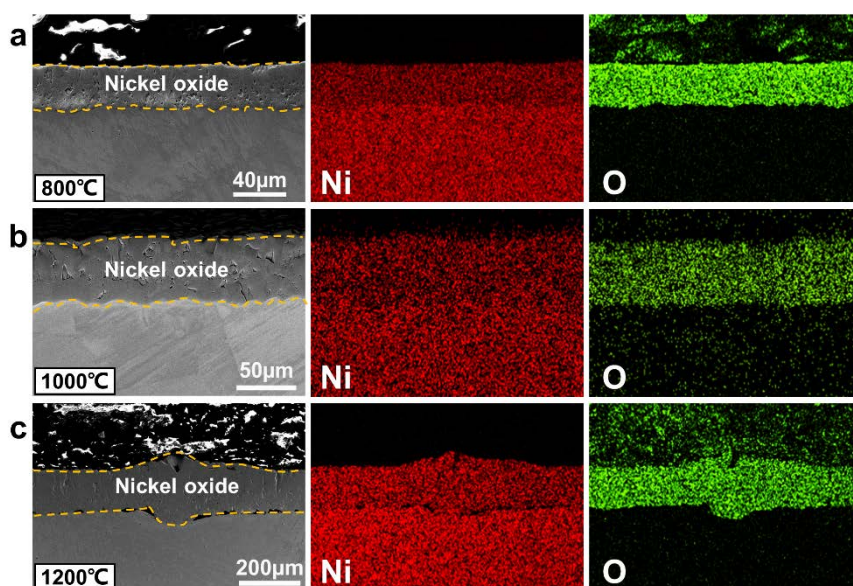


Figure S1. Cross-sectional microstructures (SE images) and EDS maps of oxide scales on Ni oxidized at (a) 800 °C, (b) 1000 °C, and (c) 1200 °C for 576 h.

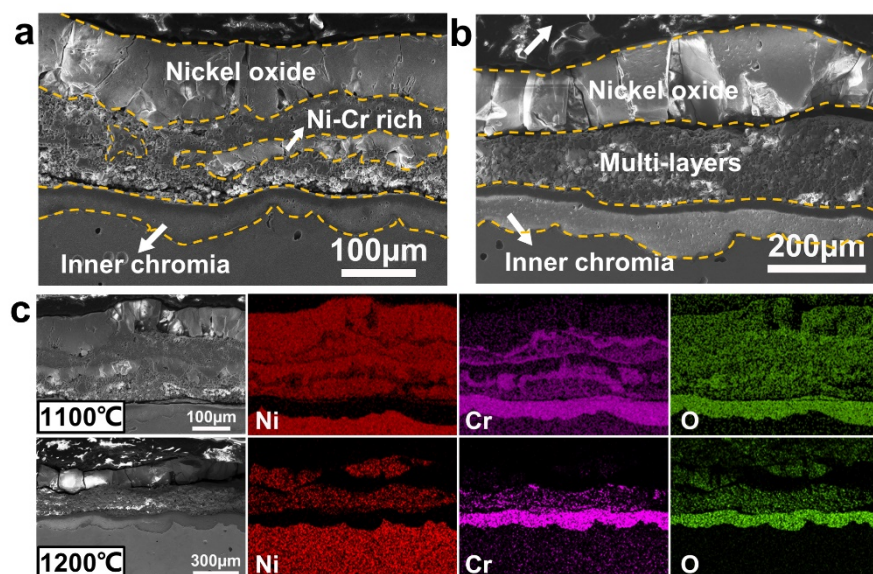


Figure S2. Cross-sectional microstructures (SE images) of oxide scales on Ni-20Cr oxidized at (a) 1100 °C, and (b) 1200 °C for 576 h. (c) EDS maps of oxide scales on Ni-20Cr oxidized at 1100 °C and 1200 °C for 576 h.

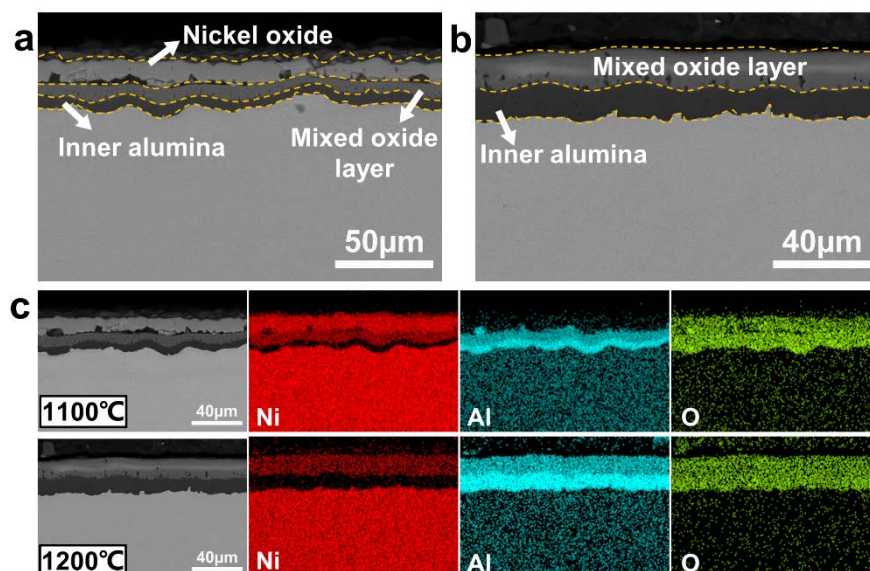


Figure S3. Cross-sectional microstructures (BSE images) of oxide scales on Ni-15Al oxidized at (a) 1100 °C, and (b) 1200 °C for 576 h. (c) EDS maps of oxide scales on Ni-15Al oxidized at 1100 °C and 1200 °C for 576 h.

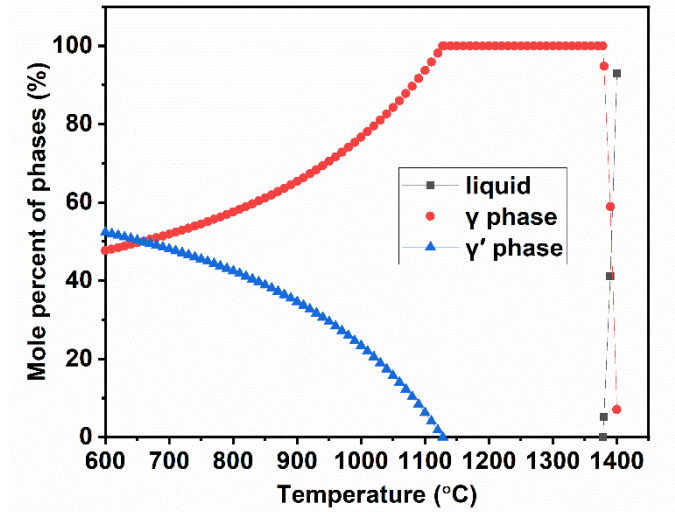


Figure S4. Thermodynamic equilibrium phase diagram of Ni-15Al-2Si calculated by Thermo-Calc software.

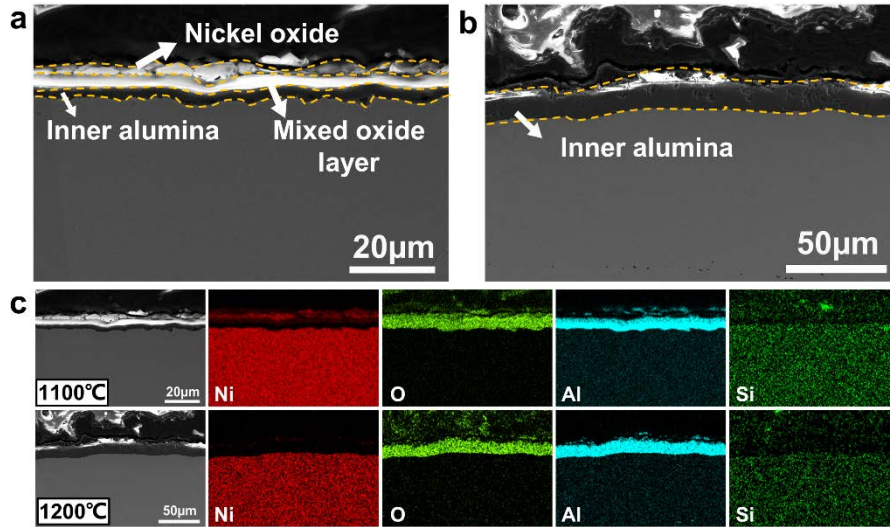


Figure S5. Cross-sectional microstructures (SE images) of oxide scales on Ni-15Al-2Si oxidized at (a) 1100 °C, and (b) 1200 °C for 576 h. (c) EDS maps of oxide scales on Ni-15Al-2Si oxidized at 1100 °C and 1200 °C for 576 h.

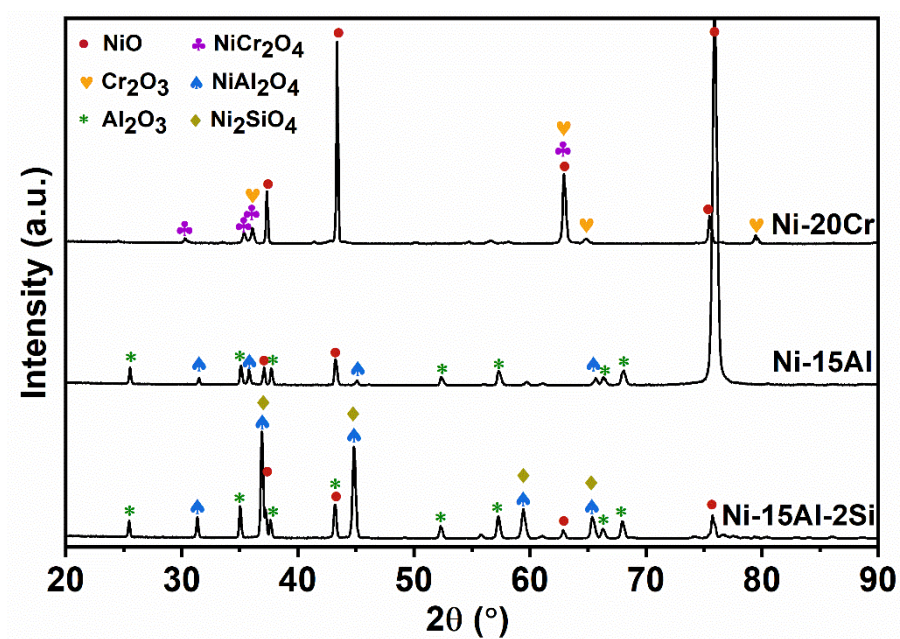


Figure S6. XRD patterns of oxides formed on Ni-20Cr, Ni-15Al, and Ni-15Al-2Si oxidized at 1000 °C for 576 h.

Table S1: Activity of Al in Ni-15Al and Ni-15Al-2Si at temperatures ranging from 700 °C to 1200 °C calculated by the Thermo-Calc software.

Temperatures	The activity of Al in Ni-15Al	The activity of Al in Ni-15Al-2Si
700 °C	1.71×10^{-10}	1.87×10^{-10}
800 °C	1.07×10^{-9}	1.17×10^{-9}
900 °C	4.84×10^{-9}	5.34×10^{-9}
1000 °C	1.44×10^{-8}	1.91×10^{-8}
1100 °C	3.04×10^{-8}	5.34×10^{-8}
1200 °C	5.69×10^{-8}	9.58×10^{-8}