

Long-Period Stacking Order of Oxygen Atoms Dissolved in α -Zirconium near the Composition $ZrO_{1/3}$ *

Sadae YAMAGUCHI and Makoto HIRABAYASHI

The Research Institute for Iron, Steel and Other Metals

Abstract

Ordered arrangements of oxygen atoms dissolved in α -zirconium near the stoichiometric composition $ZrO_{1/3}$ have been investigated by means of electron diffraction and dark-field electron microscopy. The arrangements of oxygen atoms are specified as the long period stacking sequences of the interstitial layers of octahedral sites normal to the c axis of the h.c.p. lattice. Eight kinds of the stacking variants of the oxygen layers are found in the composition range from 24 to 26 at. % O in the order of $8H$ ($7\bar{1}$), $5H$ ($4\bar{1}$), $12R$ ($3\bar{1}$)₃, $7H$ ($3\bar{1}2\bar{1}$), $10H$ ($1\bar{3}1\bar{1}3\bar{1}$), $9R$ ($2\bar{1}$)₃, $12H$ ($1\bar{3}1\bar{1}1\bar{3}1\bar{1}$) and $14H$ ($1\bar{1}3\bar{1}1\bar{1}1\bar{3}1\bar{1}$) or ($1\bar{3}1\bar{1}1\bar{1}1\bar{3}1\bar{1}$). These stackings become irregular by quenching from about 600°C.

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