Diffusivity in Cr2O3

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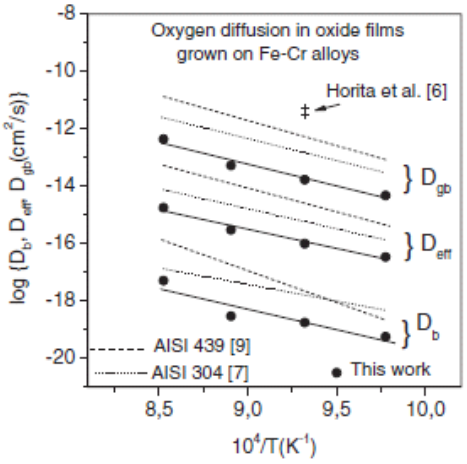
7:23 PM

Oxygen diffusivity

Oxygen diffusion by the isotopic exchange method at 1100°C.

p_{O_2} (atm)	t (s)	D ($cm^2 s^{-1}$)	v ($cm s^{-1}$)	H (cm^{-1})
10^{-9}	$8{\cdot}64 \times 10^4$	$8{\cdot}4 \times 10^{-18}$	$4{\cdot}9 \times 10^{-12}$	$1{\cdot}071 \times 10^5$
$3{\cdot}7 \times 10^{-12}$	$1{\cdot}775 \times 10^5$	$4{\cdot}4 \times 10^{-18}$	$2{\cdot}2 \times 10^{-12}$	$2{\cdot}045 \times 10^5$
$3{\cdot}7 \times 10^{-14}$	$1{\cdot}75 \times 10^5$	$3{\cdot}8 \times 10^{-18}$	$4{\cdot}22 \times 10^{-12}$	$1{\cdot}394 \times 10^5$
$1{\cdot}6 \times 10^{-16}$	$8{\cdot}64 \times 10^4$	$7{\cdot}4 \times 10^{-18}$	$2{\cdot}7 \times 10^{-12}$	$1{\cdot}351 \times 10^5$
$1{\cdot}6 \times 10^{-16}$	$1{\cdot}728 \times 10^5$	$3{\cdot}2 \times 10^{-18}$	$1{\cdot}78 \times 10^{-12}$	$2{\cdot}531 \times 10^5$

ACSSABION_PMA_1992_1 paper



Sabioni_SSI_2015

Fig. 4. Comparison of oxygen diffusivities determined in the present studies with literature data for chromia grown on Fe–Cr based alloys.

Cr diffusivity

Lobnig_1992 paper

Table III. Values of the Lattice-Diffusion Coefficient D, of the Product of Grain-Boundary-Diffusion Coefficient D' and Grain-Boundary Width δ, and Grain-Size Parameter b[29]

Base alloy	Sample	Tracer	Annealing time	$D/cm^2\ s^{-1}$	$D'\delta/cm^3\ s^{-1}$	$b/\mu m$
Fe–20Cr	1	^{54}Fe	15 min	2×10^{-14}	1×10^{-16}	0.11
	2		4 hr	3×10^{-15}	—	0.21
	3	^{53}Cr	15 min	1×10^{-14}	1×10^{-16}	0.09
	4		4 hr	4×10^{-16}	2×10^{-17}	0.06
	5	Ni	10 min	3×10^{-15}	2×10^{-19}	0.20
	6		17 min	6×10^{-15}	3×10^{-18}	0.29
	7		4 hr	8×10^{-16}	2×10^{-19}	0.58
	8	Mn	10 min	2×10^{-14}	2×10^{-17}	0.07
	9		17 min	6×10^{-14}	5×10^{-17}	0.55
	10		4 hr	2×10^{-15}	5×10^{-18}	0.20
Fe–20Cr–12Ni	11	^{54}Fe	15 min	4×10^{-15}	1×10^{-17}	0.12
	12		4 hr	7×10^{-16}	—	0.13
	13	^{53}Cr	15 min	7×10^{-15}	2×10^{-17}	0.08
	14		4 hr	8×10^{-16}	5×10^{-18}	0.10
	15	^{62}Ni	15 min	5×10^{-15}	5×10^{-19}	0.16
	16		4 hr	4×10^{-16}	1×10^{-19}	0.32
	17	Mn	15 min	2×10^{-13}	—	0.39
	18		4 hr	1×10^{-14}	—	1.19

Sabioni_MSEA_2005

Table 4
Chromium diffusion in chromia polycrystals and in chromia films [7,8,15,16]

T (°C)	pO_2 (atm)	Cr_2O_3 polycrystals		Cr_2O_3 films	
		D_b	D_{gb}	D_b	D_{gb}
700 [6]	0.1	4.2×10^{-19}	4.4×10^{-13}	2.9×10^{-18}	5.1×10^{-13}
800 [6]	0.1	4.6×10^{-18}	7.7×10^{-13}	5.9×10^{-18}	1.1×10^{-12}
900 [6]	0.1	2.1×10^{-17}	2.9×10^{-12}	2.0×10^{-17}	9.3×10^{-12}
900 [7]	10^{-15}			7×10^{-15}, 8×10^{-16}	2×10^{-10}, 5×10^{-11}