Symbols and Abbreviations

GB	grain boundary
SCL	space charge layer
FEM	finite element method
D_g	grain diffusion coefficient
D_{gb}	grain boundary diffusion coefficient
$D_{gb,true}$	grain boundary diffusivity value used in the calculation
$D_{gb,app}$	grain boundary diffusivity value obtained by using the conventional model
D_{scl}	space charge layer diffusion coefficient
Δ	ratio of the diffusivities ($= D_{gb}/D_g$)
L_g	diffusion length in the grain (bulk) ($= \sqrt{D_g t}$)
L_{gb}	diffusion length along the grain boundary
δ	grain boundary (core) thickness
δ_{scl}	space charge layer thickness
C_g	concentration in the grain (bulk)
C_{gb}	concentration in the grain boundary
C_{scl}	concentration in the space charge layer
C_{av}	average concentration obtained by integrating C_g along the direction perpendicular to the grain boundary
C_0	constant source concentration
t	diffusion time
Δx	integration interval (step) along x-direction
Δy	integration interval (step) along y-direction

y	real coordinate (depth) along the grain boundary
x	real coordinate perpendicular to the grain boundary
σ	integration constant
s	segregation coefficient
d	grain size, distance between parallel boundaries
g	area fraction of grain boundaries
β	dimensionless diffusion parameter ($= \left((\Delta - 1)\delta\right)/\left(2L_g\right)$)
α	dimensionless diffusion parameter ($= \delta/\left(2L_g\right)$)
η	dimensionless coordinate along the grain boundary
w	dimensionless coordinate along the grain boundary weighted to $\sqrt{\beta}$
ξ	dimensionless coordinate perpendicular to the grain boundary