Erratum: Trap-limited diffusion of Zn in β-Ga_2O_3 [Phys. Rev. Materials 7, 035401 (2023)]

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In the original paper, a Zn concentration in the in-diffused region of β-Ga_2O_3 samples was reported to be around 1×10^{21} cm^{-3}, based on secondary ion mass spectrometry (SIMS) measurements. However, in a follow-up study, new measurements using energy-dispersive x-ray spectroscopy in transmission electron microscopy (TEM) and scanning electron microscopy (SEM) have revealed that the Zn concentration in the β-Ga_2O_2 samples heat treated in Zn vapor is on the order of 10^{22} cm^{-3}. This concentration exceeds the limit that allows for a precise quantification using SIMS ($\sim$1%). Such a high impurity concentration raises concerns about the implications for the results in the original article. However, TEM measurements suggest the presence of nanodomains of β-Ga_2O_3, indicating that the monoclinic structure is largely preserved despite the high Zn concentration. This implies that the crystal is not single crystalline, though further analysis is needed to confirm the extent of any structural changes.

We assume that the shapes of the diffusion profiles obtained with SIMS are valid. However, with a new calibration of the Zn concentration, it was necessary with new diffusion simulations to obtain the correct migration barriers (E_m) and dissociation energies E_d. New simulations of the Zn concentration profiles using the trap-limited diffusion model are presented in Fig. 1. The

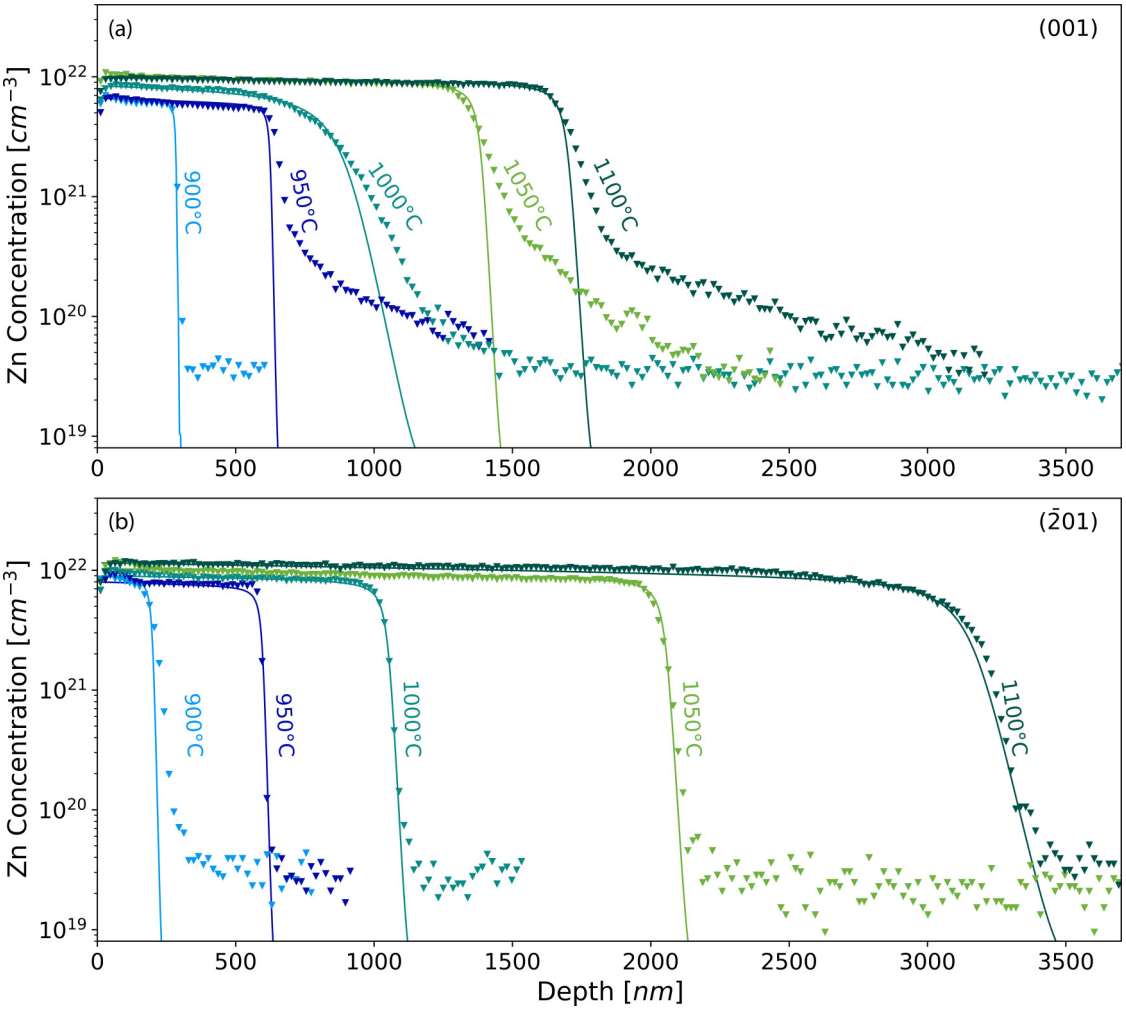


FIG. 1. The Zn concentration as a function of depth in (a) (001)-oriented and (b) ($\bar{2}$01)-oriented β-Ga_2O_2 heat treated in Zn vapor. The Zn concentration on the plateaus are on the order of 10^{22} cm^{-3}, which was incorrectly calibrated to be $\sim 10^{21}$ cm^{-3} in the original article.

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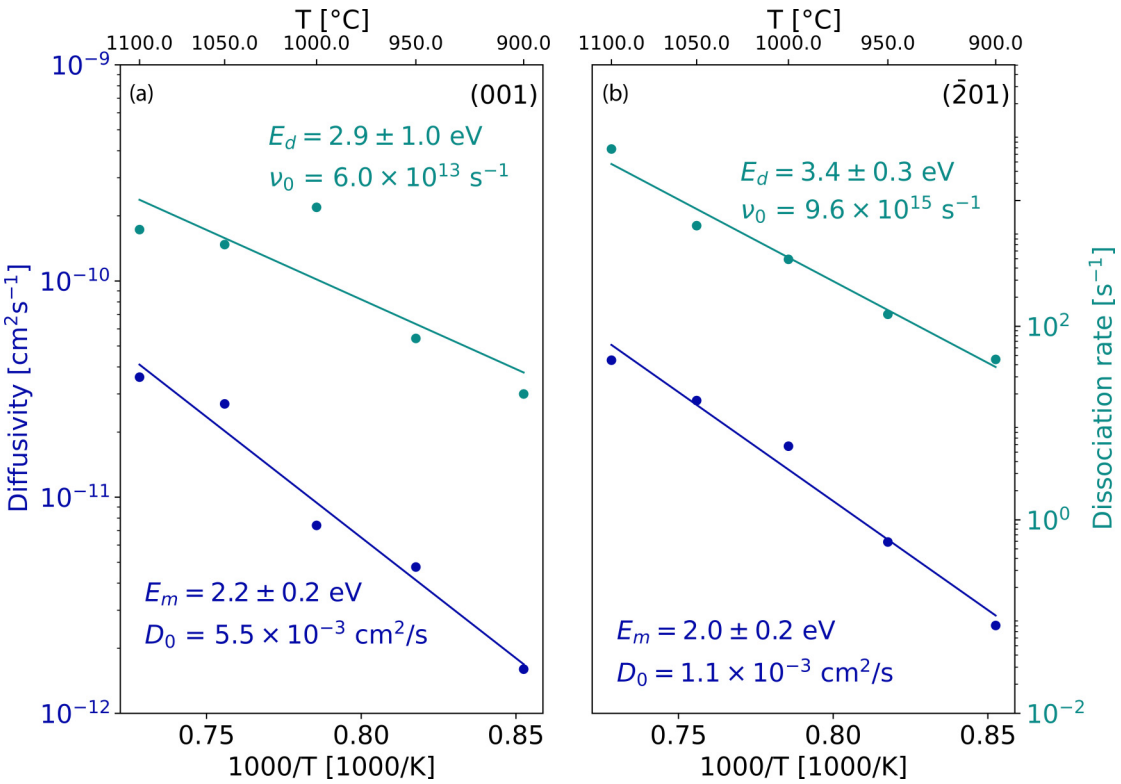


FIG. 2. Diffusivity and dissociation energy plotted as a function of inverse temperature to extract migration barriers and dissociation energies with corresponding prefactors for (a) (001)-oriented and (b) ($\bar{2}$01)-oriented β-Ga_2O_2.

extracted values for the diffusivity and dissociation rate from the new simulations are presented in Fig. 2, plotted as a function of inverse temperature. The extracted values of the new simulations are presented in Table I with the values extracted from the previous simulations. E_m in the (001) direction remains unchanged, while the other values are slightly different compared to the previous simulations. Thus, the updated values do not affect the conclusion of the article.

Data availability. No new data were created or analyzed in this study.

TABLE I. Values extracted from the diffusion simulations of the incorrectly calibrated concentration profiles and the new values extracted from simulations with the correct concentrations.

Parameter	Previous simulations	New simulations
$E_m(001)$ (eV)	2.2 ± 0.2	2.2 ± 0.2
$E_m(\bar{2}01)$ (eV)	2.1 ± 0.1	2.0 ± 0.2
$D_0(001)$ (cm^2/s)	5.5×10^{-3}	5.5×10^{-3}
$D_0(\bar{2}01)$ (cm^2/s)	2.2×10^{-3}	1.1×10^{-3}
$E_d(001)$ (eV)	3.3 ± 1.1	2.9 ± 1.0
$E_d(\bar{2}01)$ (eV)	3.2 ± 0.6	3.4 ± 0.3
$v(001)$ (s^{-1})	5.3×10^{15}	6.0×10^{13}
$v(\bar{2}01)$ (s^{-1})	2.3×10^{14}	9.6×10^{15}