



Erratum: “Laboratory Measurements of Infrared Absorption Spectra of Hydrogen-ordered Ice: A Step to the Exploration of Ice XI in Space” (2009, ApJS, 184, 361)

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A wrong value was plotted in Figure 4(a). The correct value of the full width at half maximum for 160 K is 207 cm^{-1} . Below we show the corrected figure. In addition, there was a typo in a sign in Equation (1).

According to the change in the value, following sentences in the published paper are replaced.

The sentence “The FWHM is constant at temperatures higher than 160 K and at those lower than 60 K.” in Section 3.1 is replaced with “The FWHM is constant at temperatures lower than 60 K.”

The paragraph starting with “We observed that FWHMs of librational peaks at temperatures of 4, 60, 100, and 140 K are...” in Section 4.1 of the published paper is replaced with the following paragraph:

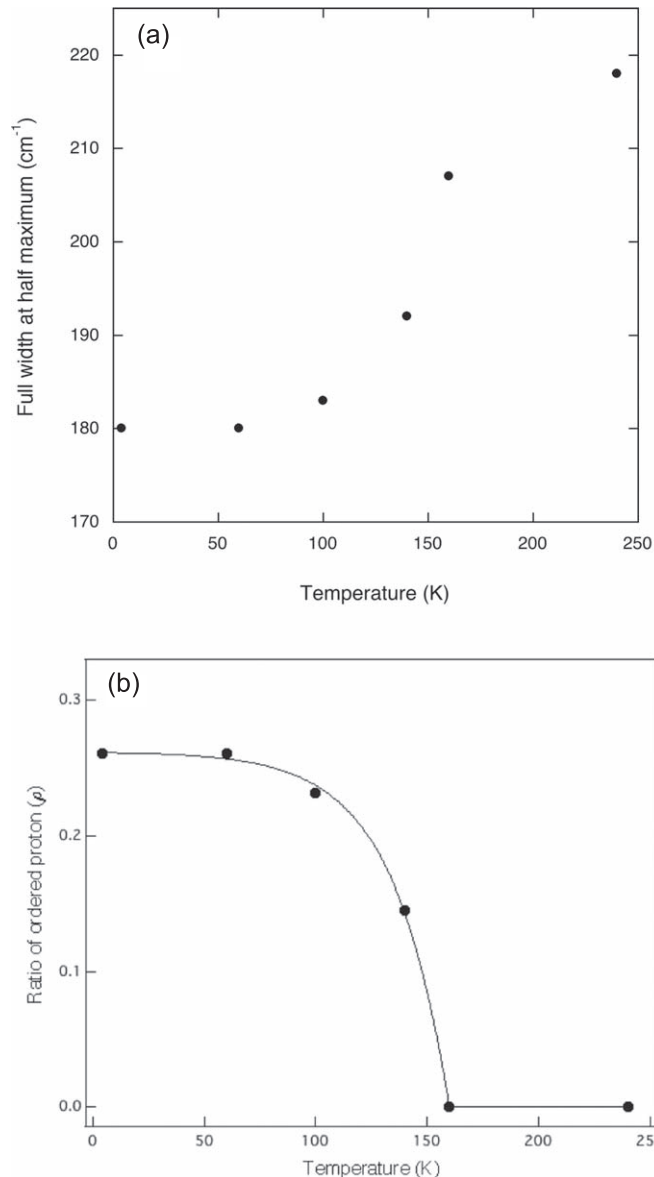


Figure 4. (a) FWHM of the librational peak against temperature. The FWHM notably decreases at temperatures less than 140 K. (b) Values of the ratio of ordered proton (ρ) against temperature T . The values here show good agreement with the equation $\rho(T) = c_1 \{1 - \exp[-J(T_0 - T)]\}$ in the range of $4 \text{ K} \leq T \leq 160 \text{ K}$, where $c_1 = 0.26$, $J = 0.039 \text{ K}^{-1}$, and $T_0 = 160 \text{ K}$.

We observed that FWHMs of librational peaks at temperatures of 4, 60, 100, and 140 K are, respectively, 13%, 13%, 12%, and 7% narrower than that at 160 K. Results show that ice at temperatures less than 140 K has partially ordered hydrogen because the decreases in FWHM are lower than 50%, as observed in the phase transition from ice Ih to XI by Fukazawa et al. (1998). The ice at 160 and 240 K is ice Ih with fully disordered hydrogen because ordering does not occur at temperatures higher than 150 K (Iedema et al. 1998; Su et al. 1998; Wang et al. 2008). Assuming that the FWHM of the IR band of librational vibrations in ice XI is 50% smaller than that in ice Ih, the ratios of ordered proton (ρ) at 4, 60, 100, and 140 K are estimated as 0.26, 0.26, 0.23, and 0.14 from the decrease in the FWHM. Figure 4(b) presents values of ρ against temperature T . The values there show good agreement with the equation

$$\rho(T) = c_1 \{1 - \exp[-J(T_0 - T)]\}, \quad (1)$$

where $c_1 = 0.26$, $J = 0.039 \text{ K}^{-1}$, and $T_0 = 160 \text{ K}$. This equation expresses the nucleation processes of ice XI (Fukazawa et al. 2002, 2005, 2006).

In the fourth, fifth, and sixth paragraphs of Section 4.1, the ρ value of 0.34 is replaced to 0.26.

These changes do not affect the scientific conclusions.

References

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| <p>Fukazawa, H., Hoshikawa, A., Ishii, Y., Chakoumakos, B. C., & Fernandez-Baca, J. A. 2006, ApJL, 652, L57</p> <p>Fukazawa, H., Hoshikawa, A., Yamauchi, H., Yamaguchi, Y., & Ishii, Y. 2005, JCrGr, 282, 251</p> <p>Fukazawa, H., Ikeda, S., & Mae, S. 1998, CPL, 282, 215</p> | <p>Fukazawa, H., Ikeda, S., Oguro, M., Fukumura, T., & Mae, S. 2002, JPCB, 106, 6021</p> <p>Iedema, M. J., Dresser, M. J., Doering, D. L., et al. 1998, JPCB, 102, 9203</p> <p>Su, X., Lianos, L., Shen, Y. R., & Somorjai, G. A. 1998, PhRvL, 80, 1533</p> <p>Wang, H., Bell, R. C., Iedema, M. J., et al. 2008, JPCB, 112, 6379</p> |
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