Determining the diffusivity of $\text{H}_i^{+}$ in $\text{In}_2\text{O}_3$ single crystals for over ten decades\(^1\) MICHAEL STAVOLA, PHILIP WEISER, YING QIN, KARLA VIL-LALTA, W. BEALL FOWLER, Lehigh University, LYNN BOATNER, Oak Ridge National Laboratory — Interstitial hydrogen ($\text{H}_i^{+}$) is an $n$-type dopant in $\text{In}_2\text{O}_3$ that has attracted attention for solar-cell applications [1]. An IR absorption line observed at 3306 cm\(^{-1}\) for $\text{In}_2\text{O}_3$ single crystals annealed in an $\text{H}_2$ ambient has been assigned to the $\text{H}_i^{+}$ center [2]. Two types of experiments have been performed to determine the diffusivity of $\text{H}_i^{+}$ in $\text{In}_2\text{O}_3$. At temperatures near 673 K, experiments have been performed to determine the diffusivity of $\text{H}_i^{+}$ from its indiffusion depth into $\text{In}_2\text{O}_3$. At 165 K, stress can be used to produce a preferential alignment of the $\text{H}_i^{+}$ center. With the help of theory, the kinetics with which this alignment can be produced yield the time constant for a single jump of the $\text{H}_i^{+}$ center and also the diffusivity of $\text{H}_i^{+}$ at 165 K [3]. These data determine the diffusivity for $\text{H}_i^{+}$ for over ten decades! [1] T. Koida $et$ $al.$, Jpn. J. Appl. Phys. 46, L685 (2007). [2] W. Yin $et$ $al.$, Phys. Rev. B 91, 075208 (2015). [3] P. Weiser $et$ $al.$, Appl. Phys. Lett., in press.

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