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Analysis of Positively Charged Muonium and its Diffusion in Cadmium Oxide

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Cadmium oxide is a transparent conducting oxide (TCO) that has many applications in optoelectronic devices, such as solar cells, photo transistors and diodes. CdO is a naturally n-type TCO with hydrogen acting as a shallow donor. MuSR zero field measurements were collected, from 20 K to 800 K, to investigate the diffusion properties of positive Mu defects in a CdO powder sample. The neutral Mu shallow donor signal is seen up to 200 K. At this temperature the neutral Mu ionizes. The calculated ionization energy is 119 meV +/- 20 meV. This result in agreement with Cox, et. al. [*J. Phys.: Condens. Matter* **18**, 1061 (2006)]. Two positive Mu sites are seen below 425 K. Above 425 K, one of the positive Mu sites becomes mobile and transitions to the second positive Mu site. By 550 K, all positive Mu have transitioned to the second site. Details relating to the transition between sites, barrier energies, and diffusion processes will be discussed in the presentation.

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