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Theory for diffusivity measurements when the temperature is ramped linearly

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Abstract content (Max 300 words) - Formatting & Special chars

Nearly all measurements to determine diffusion coefficients in solids are performed using either isochronal or isothermal measurements. Usually the diffusion coefficient, at a particular temperature, depends primarily on the microstructure of the substrate, with the type of impurity (i.e. the diffusion species) being of secondary order. When a phase change occurs in the substrate material or when a chemical reaction occurs between the diffusion species and the substrate, the diffusion mechanism usually undergoes a discrete change with a corresponding change in the diffusion coefficient as a function of temperature. Consequently, it is often highly desirable to perform in situ diffusion measurements during the heating cycle. This paper derives the necessary equations for such diffusivity measurements for the case where the temperature is ramped linearly.

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