Vibrational spectroscopy of cast Si used to fabricate solar cells: microscopic properties of nitrogen and oxygen impurities

HAOXIANG ZHANG, MICHAEL STAVOLA, Lehigh University, MIKE SEACRIST, MEMC Electronic Materials — Cast Si with grain sizes from a few mm to a few cm is commonly used for the fabrication of solar cells. Nitrogen impurities are introduced into cast Si by the SiNx coating of the crucible used for casting. Much is known about N and O centers in single-crystal Si used in microelectronics [1]. We have used vibrational spectroscopy to probe the concentration and defect configurations of nitrogen centers in cast Si used to fabricate solar cells. The interaction of N with O impurities that are present has also been investigated. The dominant N center in cast Si is a N-N interstitial pair. N-O complexes are also formed. Which defect complexes are present depends on the impurity content of the multi-crystalline Si sample, which can vary widely, and its thermal history. [1] H. Ch. Alt and H. E. Wagner, J. Appl. Phys. 106, 103511 (2009) and the references contained therein.

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