



Atomic Scale Characterization and First-Principles Studies of Si N Interfaces

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Condition: New. Publisher/Verlag: Springer, Berlin | This book offers results that influence many high temperature and pressure applications. It provides findings that will offer increased control over the performance of ceramic and semiconductor materials for a wide-range of applications. | This thesis presents results from a combined atomic-resolution Z-contrast and annular bright-field imaging and electron energy loss spectroscopy in the Scanning Transmission Electron Microscopy, as well as first principles studies of the interfaces between crystalline beta - Si₃N₄ and amorphous (i) CeO_{2-x} as well as (ii) SiO₂ intergranular film (IGF). These interfaces are of a great fundamental and technological interest because they play an important role in the microstructural evolution and mechanical properties of Si₃N₄ ceramics used in many high temperature and pressure applications. The main contribution of this work is its detailed description of the bonding characteristics of light atoms, in particular oxygen and nitrogen, at these interfaces, which has not been achieved before. The atomic-scale information on the arrangement of both light and heavy atoms is critical for realistic modeling of interface properties, such as interface strength and ion transport, and will facilitate increased control over the performance of ceramic and semiconductor materials for a...



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