Nano Structures Studied by Convergent Beam Electron Diffraction

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Lattice defect and interface analyses by using the large angle technique [1] of convergent-beam electron diffraction are reviewed. The large angle convergent-beam electron diffraction (LACBED) enables us to obtain real- and reciprocal-space information of lattice defects and interfaces.

The technique can determine the shift vector of a stacking fault and the Burgers vector of a dislocation much more reliably than the traditional electron-microscope-image method can. Screw and edge dislocations can be distinguished easily by the technique [2]. The angular change at a twin boundary can be determined with an accuracy of less than 0.1 degree, while a better accuracy than 1 degree is not possible in ordinary or spot electron diffraction.

The high accuracy to the angular change of a crystalline specimen was applied to the studies of strain in multilayers [3]. And then, many strain measurements at the interfaces of various multilayer materials have been successfully conducted. Recent years, strain analysis can be conducted using automatic analysis programs, which take account of dynamical diffraction effects [4].

In the present review, the large angle technique is explained, analyses of stacking faults and dislocations are demonstrated and examples of strain measurements of semiconductor layer materials are presented.

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Keywords: LACBED, lattice defect identification, interface analysis