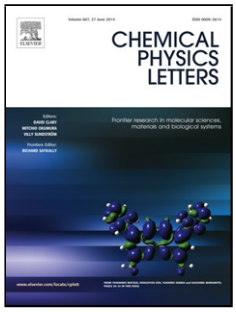

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The Rapidly Changing Face of Electron Microscopy

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Abstract

This short but wide-ranging review is intended to convey to chemical physicists and others engaged in the interfaces between solid-state chemistry and solid-state physics the growing power and extensive applicability of multiple facets of the technique of electron microscopy.

Keywords: atomic resolution; electron tomography; electron energy-loss; energy-dispersive X-ray spectroscopy; electron cartography.

1. Introduction

Fifty years ago electron microscopy (EM) had already made a profound impact both on molecular biology and metallurgy. A negative staining method for high-resolution EM of viruses soon led to major progress in three-dimensional (3D) image reconstructions of small viruses [1-3]; and the reality of the existence, movement and importance of dislocations in crystalline solids were rendered visible by electron diffraction contrast [4]. Chemists, and to a lesser degree, materials scientists, were relatively slow to capitalize upon the power of EM; but the situation, for chemical physicists especially, has been utterly transformed in the last thirty years [5, 6], and the pace of change in chemical electron microscopy is now very considerable.

Four years ago, two of us published a synoptic account [7], aimed at the community of chemical physicists in which, *inter alia*, we summarised the myriad array of structural and