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Author: John Meurig Thomas Rowan K. Leary Alexander S. Eggeman Paul A. Midgley

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# The Rapidly Changing Face of Electron Microscopy

John Meurig Thomas\*, Rowan K. Leary, Alexander S. Eggeman and Paul A. Midgley

Department of Materials Science & Metallurgy, University of Cambridge, 27 Charles  
Babbage Road, Cambridge, CB3 0FS, UK

\*Corresponding author: jmt2@cam.ac.uk

Tel: +44 1223 334300, Fax: +44 1223 334567

## 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

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