

# David C. Joy

Distinguished Scientist and Professor  
Multiscale Functionality Group  
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## Education

Trinity College, Cambridge, UK	Natural Sciences	B.A., 1996
Trinity College, Cambridge, UK	Natural Sciences	M.A., 1966
Linacre College, Oxford, UK	Materials Science	Ph.D., 1969

## Research Interests

Primary interests have been in the development of new techniques for electron microscopy and electron-beam microanalysis. Developments have included the first practical electron energy loss spectrometer for a transmission electron microscope, early work on field emission and other high brightness sources, and the first U.S. demonstration of electron beam holography. Development of Monte Carlo models of electron and ion beam interactions with solids, liquids and gases. These have been used in particular for nano-metrology as applied to both semiconductor devices and nano-particles and biological systems.

## Professional Experience

1987–p	Distinguished Scientist, Multiscale Functionality Group, Center for Nanophase Materials Sciences, ORNL
1987–p	Distinguished Professor, University of Tennessee-Knoxville
1974–1987	Technical Staff, AT&T Bell Laboratories, Murray Hill, NH
1969–1974	Royal Society Warren Research Fellow, Dept. of Metallurgy, University of Oxford, UK

## Professional and Synergistic Activities

1980–1992	Editor, <i>The Journal of Microscopy</i>
1993–p	Editor in Chief, <i>Scanning</i>
1998–2000	President, Microscopy Society of America
2001–p	Member Organizing Committee, SPIE Advanced Lithography Annual Conference
2007–p	Organizing Committee Member, EIPBN (“Three Beams”) Annual Conference
2004	Organizer, CNMS Workshop on Microscopy and Spectroscopy
2005–2008	Charter Member, NIH “Microscopy and Microanalysis,” Study Section
2009–p	Appointed Member International Review Board for Australian Microscopy Microanalysis Research Facility
2009–p	Member International Review Board for ETH/EMAZ Zurich, Switzerland

## Honors and Awards

2011	Editor Emeritus “SCANNING”
2010	Awarded the ‘Duncumb Medal’ of the Microbeam Analysis Society
2009	Elected Fellow, The Microscopy Society of America
2002	National Winner, UT-Batelle Science and Technology Challenge
2000	“One of the Best Papers of the 20 <sup>th</sup> Century,” cited by NIST, Washington, D.C., “Microelectronic Dimensional Metrology in the SEM,” <i>Solid State Technology</i> , Co-Authored with Dr. M. Postek, NIST
1983	Elected Fellow, Royal Microscopical Society, (London, UK)

## Selected Peer-Reviewed Publications (Author of >400 articles in refereed journals and books):

Joy D. C., “Scanning Beam Methods,” *Handbook of Nanoscopy* **1**, 615-643 (2012).  
Joy D. C., Griffin B. J., “Is Microanalysis Possible in the Helium Ion Microscope?,” *Microscopy and Microanalysis* **17**, 643-649 (2011).  
Smith D. A., Joy D. C., Rack P. R., “Monte Carlo Simulations of He<sup>+</sup> induced deposition,” *Nanotechnology* **21**, 4-12 (2010).

Joy, D. C., “Scanning Electron Microscopy: Second Best no more”, *Nature Materials* **8**, (10), 776-777 (2009).

Ramachandra R., Griffin B., Joy D. C., “A model of secondary electron imaging in the Helium Ion scanning microscope,” *Ultramicroscopy* **109**, 748-757 (2009).

Klein K.L., Melechko A. V., McKnight T. E., Retterer S.T., Rack R. D., Fowlkes J. D., Joy D. C. Simpson M. L., “Surface Characterization and functionalization of carbon Nanofibers,” *J.Appl.Phys.* **103** (6), 061301 (2008).

**Patents (Six patents in the field of electron microscopy and microanalysis, including):**

“Patterning Methods and Systems Using Reflected Interference Patterns,” David C Joy and Daniel Herr, U.S. Patent 6,730,443, Issued May 4, 2004.

**Collaborators Outside ORNL During Past Two Years:** A. Eades, Lehigh University; M. Gomati, University of York (UK); B. Griffin, University of Western Australia; Y. Lee Auburn University; D. Newbury, NIST; B. Thiel, University of Albany; A. Vladar, NIST.

**Graduate and Postdoctoral Advisors:** Prof. Sir Peter Hirsch FRS, University of Oxford, UK

**Thesis Advisor and Postgraduate-Scholar Sponsor:**

**Students (Most recent listed, 16 other Ph.D. students since 1990):** Ranjan Ramachandra 2007–2009 Ph.D.; Satya Bari 2007–2009 M.S.; Medhi Bolarizade 2003–2007 Ph.D.

**Postdoctoral Scholars:** Hendrix Demers 2005–2007; Peter Ko 2000–2003; Bernhard Frost 2003–2007

Total Graduate Students Advised: 19

Total Postdoctoral Scholars Advised: 5