

information (specifically, size and areal density). This paper serves to demonstrate the power of deep learning-based computer vision models for material image studies and suggests the possibility that most aspects of defect analysis may soon be practically automated, and many, if not all, handcrafted feature-based methods may be replaced by deep learning methods.

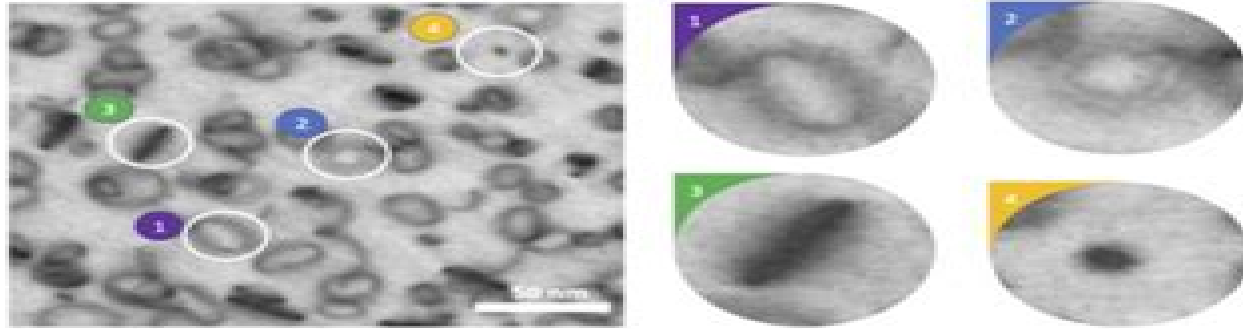


Figure 1. Selected bright field scanning transmission electron microscopy (STEM) image of an irradiated ferritic alloy showing four common morphologies of dislocation loops: (1) open ellipse loops (single ring edge), (2) open ellipse loops (double ring edges), (3) closed elliptical solid loops, (4) closed circular solid dots. Open single edge ellipse loops (1) are dislocation loops with a Burgers vector of $\frac{a_0}{2} \langle 111 \rangle$. Open double edge ellipse loops (2) and closed elliptical solid loops (3) are dislocation loops with a Burgers vector of $a_0 \langle 100 \rangle$. Closed circular solid dots (4) are black dot defects with a Burgers vector of either $\frac{a_0}{2} \langle 111 \rangle$ or $a_0 \langle 100 \rangle$. Image size: Primary image is 290×290 nm; inset scales arbitrary.

Defect Analysis In Electron Microscopy

N Colangelo



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Defect Analysis in Electron Microscopy M. H. Loretto, R. E. Smallman, 1975-01-01 **Automated Defect Analysis in Electron Microscopy Images** Wei Li, 2018 *Microelectronics Failure Analysis*, 2004-01-01 For newcomers cast into the waters to sink or swim as well as seasoned professionals who want authoritative guidance desk side this hefty volume updates the previous 1999 edition It contains the work of expert contributors who rallied to the job in response to a committee's call for help the committee was assigned to the update by the Electron **Microelectronic Failure Analysis**, 2002-01-01 Provides new or expanded coverage on the latest techniques for microelectronic failure analysis The CD ROM includes the complete content of the book in fully searchable Adobe Acrobat format Developed by the Electronic Device Failure Analysis Society EDFAS Publications Committee **Physics of Modern Materials: Characterization of materials, defects, and mechanical properties**, 1980 **Plastics Failure Analysis and Prevention** John Moalli, 2001-12-31 This book contains analysis of reasons that cause products to fail General methods of product failure evaluation give powerful tools in product improvement Such methods discussed in the book include practical risk analysis failure mode and effect analysis preliminary hazard analysis progressive failure analysis fault tree analysis mean time between failures Wohler curves finite element analysis cohesive zone model crack propagation kinetics time temperature collectives quantitative characterization of fatigue damage and fracture maps Methods of failure analysis are critical to for material improvement and they are broadly discussed in this book Fractography of plastics is relatively a new field which has many commonalities with fractography of metals Here various aspects of fractography of plastics and metals are compared and contrasted Fractography application in studies of static and cycling loading of ABS is also discussed Other methods include SEM SAXS FTIR DSC DMA GC MS optical microscopy fatigue behavior multiaxial stress residual stress analysis punch resistance creep rupture impact oxidative induction time craze testing defect analysis fracture toughness activation energy of degradation Many references are given in this book to real products and real cases of their failure The products discussed include office equipment automotive compressed fuel gas system pipes polymer blends blow molded parts layered cross ply and continuous fiber composites printed circuits electronic packages hip implants blown and multilayered films construction materials component housings brake cups composite pressure vessels swamp coolers electrical cables plumbing fittings medical devices medical packaging strapping tapes balloons marine coatings thermal switches pressure relief membranes pharmaceutical products window profiles and bone cements *Diffusion and Defect Data*, 2001 *Computed Electron Micrographs And Defect Identification* A.K. Head, 2012-12-02 Computed Electron Micrographs and Defect Identification illustrates a technique for identifying defects in crystalline solids by the comparison of their images which are produced in the electron microscope with corresponding theoretical images This book discusses the diffraction of electrons by a crystal the two beam dynamical equations the absorption parameters the deviation of the crystal from the Bragg

reflecting position the extinction distance the displacement vector and the foil normal Chapter three presents the experimental techniques for determination of beam direction defect line normal foil normal foil thickness and extinction distance Chapters four to seven explore ONEDIS and TWODIS and their principles Chapters eight and nine focus on the application and limitations of the technique while the last chapter explores the different computer programs related to the technique Post graduate students as well as researchers using transmission electron microscopy for studying defects in crystalline solids will find this book invaluable

Defects and Diffusion in Semiconductors, 2007 **Microscopy and Analysis**, 2004 **ISTFA 1997: International Symposium for Testing and Failure Analysis** Grace M. Davidson, ASM International, 1997-01-01 Microstructural Characterisation of Metals and Alloys P. E. J. Flewitt, R. K. Wild, 1986 *Beam Injection Assessment of Microstructures in Semiconductors* Hajime Tomokage, Takashi Sekiguchi, 2001 The characterisation of semiconductors is of key importance in preparing and applying semiconductors in industry The present work deals with theoretical and experimental topics which are related to the assessment of microstructures in semiconductors by means of beam injection and related methods ISTFA 2006 Electronic Device Failure Analysis Society, ASM International, 2006

ISTFA 2009, 2009-01-01 This volume features the latest research and practical data from the premier event for the microelectronics failure analysis community The papers cover a wide range of testing and failure analysis topics of practical value to anyone working to detect understand and eliminate electronic device and system failures Case histories and review papers are included as well as guides to new and unique tools and methodologies applications and results **ULSI Semiconductor Technology Atlas** Chih-Hang Tung, George T. T. Sheng, Chih-Yuan Lu, 2003-10-06 More than 1 100 TEM images illustrate the science of ULSI The natural outgrowth of VLSI Very Large Scale Integration Ultra Large Scale Integration ULSI refers to semiconductor chips with more than 10 million devices per chip Written by three renowned pioneers in their field ULSI Semiconductor Technology Atlas uses examples and TEM Transmission Electron Microscopy micrographs to explain and illustrate ULSI process technologies and their associated problems The first book available on the subject to be illustrated using TEM images ULSI Semiconductor Technology Atlas is logically divided into four parts Part I includes basic introductions to the ULSI process device construction analysis and TEM sample preparation Part II focuses on key ULSI modules ion implantation and defects dielectrics and isolation structures silicides salicides and metallization Part III examines integrated devices including complete planar DRAM stacked cell DRAM and trench cell DRAM as well as SRAM as examples for process integration and development Part IV emphasizes special applications including TEM in advanced failure analysis TEM in advanced packaging development and UBM Under Bump Metallization studies and high resolution TEM in microelectronics This innovative guide also provides engineers and managers in the microelectronics industry as well as graduate students with More than 1 100 TEM images to illustrate the science of ULSI A historical introduction to the technology as well as coverage of the evolution of basic ULSI process problems and issues Discussion of TEM in other

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